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BY THE SAME AUTHOR.

- DIE VENEN DER VORDEREN RUMPFWAND DES MENSCHEN.**
With Prof. W. BRAUNER. (Veit & Co., Leipzig.) 1884.
- THE ELECTRIC ILLUMINATION OF THE BLADDER AND URETHRA.** Second Edition. (Churchill.) 1889.
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- CHIRURGIE DER NIEREN: KLINISCHES HANDBUCH DER HARNORGANE.** (Vogel, Leipzig.) 1899.
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TO

DR. MAX NITZE,

THE FATHER OF THE ELECTRIC-LIGHT CYSTOSCOPE,

THESE CLINICAL STUDIES ARE GRATEFULLY
INSCRIBED

BY THE AUTHOR.

PREFACE.

I REGRET that this work on Electric Cystoscopy was not ready to accompany the international testimonial offered to Dr. Max Nitze in the early part of the year, for without the cystoscope, which we owe to his mechanical genius, the studies which I have attempted to describe in the following pages, and which I now gratefully dedicate to him, could not have been carried out. For it is to his genius that the profession is indebted for the method which has revolutionised our knowledge and greatly modified our operative treatment of surgical urinary disease.

It will, however, be observed that I have not quoted the conclusions which he and other workers have arrived at. I have purposely avoided studying any literature bearing upon the subject of clinical cystoscopy. In defence, I may say that this is not the result of egotism, but due to a studious endeavour to avoid unconscious plagiarism and bias. I feel strongly that sound progress in the clinical knowledge of any new field can only be obtained by the consensus of opinions which have been independently formed. "Man is mimetic; we repeat without thought the opinions of some third person who has adopted them without inquiry."

Three sections of this book—Ulceration, Tumours of the Bladder, and Ureteric Meatoscopy,—have already been published separately. This was partly for the convenience of classes on Cystoscopy and partly because the subjects are the sections most likely to undergo change.

Should my increased experience prompt me to deal with them more in detail, I can do so more easily in a second edition of each section rather than in another costly edition of the entire volume. I do not advocate Ureteric Catheterisation, nor do I operate with the various ingenious intravesical operating cystoscopes which Dr. Nitze and Dr. Caspar have devised. They do not appeal to me as safe or effective, but I allude to them for the careful consideration of others less prejudiced than myself. The clinical work is based upon fifteen years' experience of the Nitze method and compiled from my notes of patients whom I have watched, many of them for years; I alone am responsible for the deductions advanced. For the pathological findings I am much indebted to Mr. J. H. Targett, who has been most helpful in reporting on the microscopy of various growths. The bacteriological work has been ably carried on by Mr. Leslie Eastes, who has been especially successful in Urinary Tuberculosis, detecting the tubercle bacillus with certainty in quite 500 samples of urine.

I am glad to seize this opportunity to tender to my professional friends my very grateful thanks for their unfailing courtesy and for the infinite trouble they have taken in keeping me acquainted with the progress of the patients.

E. HURRY FENWICK.

14, SAVILE ROW, LONDON, W.

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PART I.

TECHNICAL.

PART I.

TECHNICAL.

ELECTRIC-LIGHT CYSTOSCOPY.

CHAPTER I.

THE HISTORY OF VESICO-URETHRAL ENDOSCOPY.

It will be found on reference to the abundant literature of endoscopy that the history of its progress falls without effort, according to the character of the illuminant, into three distinct periods :

1. The paraffin lamp period.
2. The platinum loop period.
3. The incandescent glow lamp period.

The opening of each period is thus obviously marked by a measureable advance upon the progress of its predecessor.

FIRST PERIOD.

The Paraffin Lamp.

The first period commenced in 1805 with the invention by Dr. Bozzini,* of Frankfurt, of an apparatus which he termed the light conductor (Lichtleiter). Although the instrument was condemned by the Medical Faculty of Vienna on the ground of insufficient illumination, yet the idea was grasped by the profession, and the method found many imitators. Thus, John Fisher, in 1824, completed an instrument which contained the principles

* Bozzini, "Lichtleiter, eine Erfindung zur anschauung innerer Theile und Krankheiten," 'Journ. d. prakt. Arznt. u. Wundarznk.,' Berlin, 1806, xxiv, 107—124.

upon which the Desormeaux endoscope of 1853 was constructed. Ségalas, to whom Desormeaux wrongly accords the merit of originating the principles of endoscopy, followed Fisher with a speculum urethrocycticum. Bombalchini, John Avery of London, Cazenave of Paris, Gessler, Malherbe, Espezel, all added to the literature of the subject, and attempted to improve the instruments for visual examination of the urethra and bladder.

The second period reached its meridian in 1853 when Desormeaux,* "the father of endoscopy," as Warwick has called him, laid the first practical endoscope before the Academy of Medicine at Paris, and by his powerful and enthusiastic advocacy did much to favour the development of the science. Furstenheim made the endoscope popular in Germany. In 1865 Cruise,† of Dublin, made an important improvement in Desormeaux's endoscope. This consisted in concentrating upon a reflector *the edge of a flat flame* of an ordinary petroleum lamp.

Camphor was mixed with the petroleum (gr. x ad 3j) to increase the brilliancy of the light, and an extra tall chimney was added to produce a steady flame. As this endoscope is typical of this period we shall describe it in Mr. Cruise's own words.

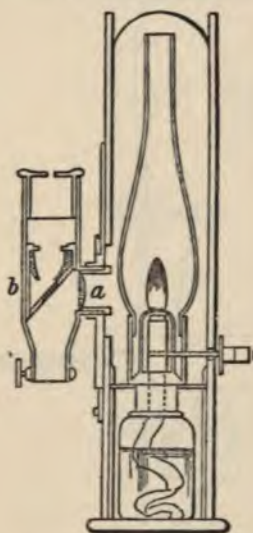
"Fig. 1 shows it in sectional view. It consists of a lantern, in the interior of which the lamp is suspended by means of a diaphragm, which slides in grooves and holds it perfectly steady. The lamp is so placed when in the lantern that the *edge* of the flame is opposite the aperture of the tube (a). This tube rotates freely in the socket which receives it, and carries the condensing lens. It is attached at right angles to another tube (b), which, in the woodcut, for clearness sake, is represented in the vertical position. This latter tube holds the perforated

* 'De l'Endoscope et de ses Applications au Diagnostic et au Traitement, etc.' Par A. J. Desormeaux. Paris: J. B. Baillière et Fils, 1865.

† "The Endoscope as an Aid in the Diagnosis and Treatment of Disease." By F. R. Cruise, M.D.Univ. Dub., etc. 'Dublin Quarterly Journal of Medical Science,' May 1st, 1865. Fannin and Co., Dublin.

mirror, and terminates at one end in a socket, which, by means of a thumb-screw, can be fitted to the various exploring specula; while at the other extremity is placed an eye-piece through which the observer looks. Although represented in Fig. 1 in the vertical position in order to

FIG. 1.



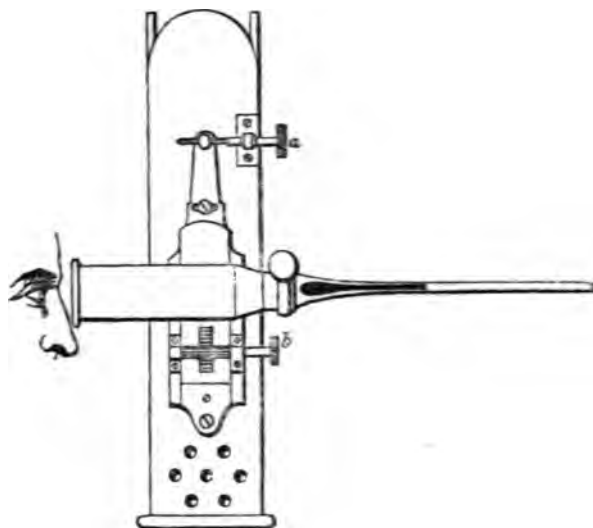
show a section of its interior, in use it is kept as nearly as possible horizontal, as delineated in Fig. 2. In order to protect the observer's eye from glare as much as possible, a conical diaphragm with a very minute aperture is placed directly behind the perforated mirror, and the interior of the apparatus and specula is carefully blackened. To suit myopic and presbyopic eyes adjusting glasses are provided, and these, when required, take the place of the eye-piece.

"To prevent inconvenience from the great heat evolved by this powerful light the lantern is made of mahogany, and consequently never becomes so warm as to inconvenience the hand; were it of metal it would soon be impossible even to touch it. This end is further

carried out by having the top open, and air-holes perforated in the lower part of its sides (*vide* Fig. 2) and in the diaphragm. These arrangements produce a constant draught of cool air through the apparatus, which has the additional good effect of steadying and intensifying the flame.

“The mode of adjustment of the condensing lens and

FIG. 2.



mirror to the pencil of light given off by the edge of the flame is the next point to be explained. The tube (Fig. 1, *a*), is received into a socket, wherein it freely rotates; this socket is mounted on a doubly shifting stage, the mechanism of which will be best understood by reference to Fig. 2. It admits, as may easily be seen, of two motions, right and left, governed by the tangent screw (*a*); up and down, regulated by the rack and pinion (*b*). By this contrivance the lens can be easily shifted about as required. The height of the flame itself is regulated by a button.

“The cannula for the bladder (Fig. 3) resembled in

shape the catheter recommended by Mercier in certain affections of the prostate gland. At the extremity of the long shaft a little window of glass is let in to permit the

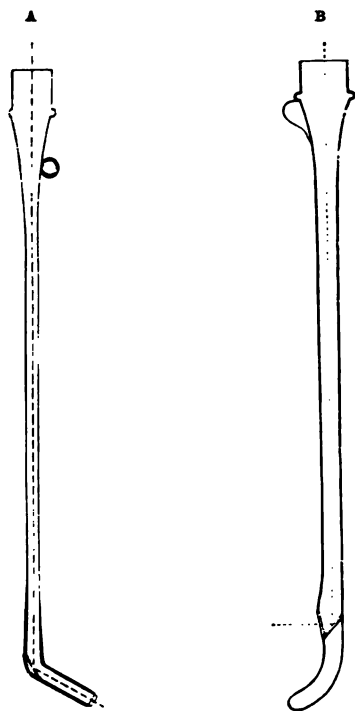
FIG. 3.



transmission of light, and is carefully cemented round so as to render the instrument water-tight. The glass is set in a somewhat slanting direction, so as to obviate the reflection of the light from the perforated mirror, which might greatly embarrass the observer. This form of catheter is easily introduced into the bladder, and then the endoscope may be attached thereto. As the instrument is moved about, the eye of the examiner can see, bit by bit, the whole surface near to which its glazed extremity can be brought, viz. the border of the prostate, the trigone, the fundus, and greater portion of the posterior surface. The endoscope being held in the left

hand and manipulated therewith, the index finger of the right hand introduced into the rectum can give much assistance in the investigation by raising the fundus and bringing it into proximity with the exploring tube. The anterior surface of the bladder has heretofore eluded ocular examination, but I am sanguine of being able to

FIG. 4.



remedy this disability ; fortunately it is rarely the seat of disease."

In 1867 Cruise overcame the difficulty of the examination of the anterior wall by an instrument of his own construction which he thus describes : * "A speculum, in

* F. R. Cruise, "On Irrigation of the Bladder in Cystoscopy," 'Lancet,' 1880, vol. i, p. 372, Feb. 23rd. This instrument was exhibited at the Dublin meeting of the British Medical Association in 1867.

form like the one represented at Fig. 3, in place of having a glazed aperture at the angle, contains there a mirror of polished metal, while the window is placed at the end of the short arm (Fig. 4A). The light, following the direction indicated by the dotted lines, is reflected by the mirror, and passes through the window; and when the instrument is directed properly, as indicated by the projecting ring at the outer extremity, it illuminates and exhibits on the mirror the anterior or the lateral surfaces of the bladder. At first I encountered a serious difficulty, which took me some time and study to overcome. So long as the glass window was set at right angles to the ray of light I could see nothing except a brilliant glare. Thinking out the matter, I came to see that it (the glass window), being in a dark cavity, acted as a reflector, and simply sent back the light. In fact, I realised that I was like a person who, candle in hand, looks out of window into the dark. All that can be seen under such circumstances is the image of the candle itself. Ultimately, by setting the window at a slight angle (15 degrees) to the direction of the illuminating rays, I eluded this difficulty and saw all clearly. Next I set to work to find a means of examining the neck of the bladder. For this purpose I devised the speculum figured B (Fig. 4). In it the short curve is solid, and just where it commences a lateral window is set, at a proper angle to evade the difficulty already described, and placed opposite a little mirror. The position of the window is indicated by a projecting flange at the outer end of the speculum. A glance at the accompanying woodcut, B, will make these details intelligible, and explain how, when this speculum is rotated in the bladder, whilst jointed into the illuminating tube of my endoscope, bit by bit the neck of the bladder comes into view. With these specula and my lantern I am thus able to take a complete survey of the whole interior and of the neck of the bladder."

Soon after Cruise had perfected the urethroscope

Christopher Heath used it at the Lock Hospital in London, and introduced it to the profession in England.* Following Heath is a long list of contributors to the subject: H. Thompson, Pridgin Teale, Henry Dick, Bumstead, Brunton (otoscope), Mallez, Tarnowsky, Stein (photoendoskop), Wales, Ebermann, Rider, Emmert, Fenger, Weir, Lee, Conriard, Grünfeld,† and others.

Langlebert produced a very much simpler urethroscope in 1868, which could be used with daylight, lamp, or candle. Probably Langlebert's urethroscope was a model of Warwick's in 1867.

With certain changes in the reflection of the light from plane or concave mirrors, and in the source of light, as gas, magnesium light, oxycalcium or Drummond light, sunlight, daylight, candle, and lamp, the endoscope underwent but little modification until the commencement of our *second period*, the electrical, in 1879.

SECOND PERIOD.

The Platinum Loop.

Although to Dr. Max Nitze belongs by right the honour and the credit of introducing the method of employing the electric light in the illumination of the deeper cavities of the body, such as the stomach and bladder, for diagnostic purposes, yet the successful use of electric light in endoscopy, and even the method of its production, was by no means an innovation in 1879. Fifteen years prior to the date of Dr. Nitze's original experiments, Bruck,‡ of Breslau, a dentist, had conceived the brilliant idea of utilising a platinum loop, maintained

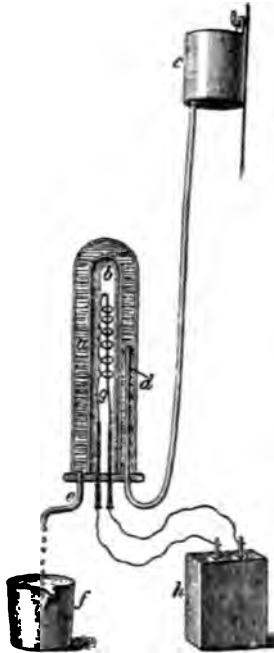
* Heath, C., "The Endoscope as a Means of Diagnosis and Treatment of Urethral Disease," 'Lancet,' 1866, pp. 408—411.

† I am indebted to Grünfeld's article, "Das Endoskop," 'Wiener Klinik,' 1877, for many references to the literature and much sound knowledge.

‡ Bruck, 'Das Urethroskop und das Stomatoscop zur durchleuchtung der Blase und der Zähne und ihrer Nachbartheile durch galvanisches Glühlicht,' Breslau, 1867.

at a white heat by means of a galvanic current, as the source of light for examining the mouth. He constructed and successfully used an instrument of this kind which he called the stomatoscope. He even advocated the use of the electric light in examination of the rectum and bladder; but the diaphanoscope which he designed for this purpose was tried at the Vienna Hospital and found

FIG. 5.



to be unpractical. The method was forgotten, and the instrument fell into unmerited disuse. The construction of Bruck's diaphanoscope is of the simplest, and as Dr. Nitze's and the Nitze-Leiter instruments are modelled upon the same principle, it will not be out of place to introduce it here by way of illustration.

Bruck's diaphanoscope is represented in Fig. 5.

It will be seen that the incandescent loop of platinum, *g*, is surrounded and kept cool by a water cylinder, *a*, which is supplied with a continual stream of cold water from the cistern, *c*, through the pipe, *d*; *h* is the battery generating the galvanic current.

Dr. Schramm, of Dresden also, to whom Dr. Nitze was assistant, and from whom, may be, Dr. Nitze received the idea of the platinum loop, had caused a similar instrument to be constructed for diaphanoscopy of the ovaries. The intention was to cause a light placed in the vagina to traverse the abdomen, and to allow the physician to distinguish the outline of, and to notice any change in, the size of the ovary by means of the transmitted light. I have been given to understand that the attempt was partially successful in a darkened room with a very thin subject.

In the middle of 1876 Dr. Nitze had the skeleton of the future electric cystoscope ready, and in the autumn of 1877 the instrument for the urethra, bladder, and larynx so far advanced that they could be used on the living subject.

In December, 1877, Dr. Oberländer, of Dresden, began to use Dr. Nitze's urethroscope, which had been made by Diecke, of Dresden. But the practical completion of the cystoscope and gastroscope presented difficulties with which the Dresden instrument maker, Deicke, was unable to cope, and Dr. Nitze therefore took these latter, as well as the urethroscope, to Lieter, of Vienna.

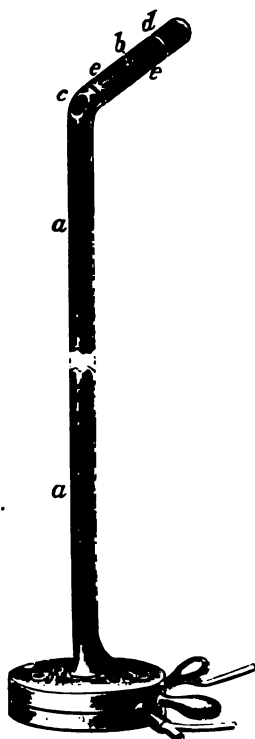
The cystoscope, which Dr. Nitze submitted to Leiter,* of Vienna, to improve in certain technical details, was constructed as follows. It is represented in Fig. 6.

It consisted of the catheter tube, *a*, which was bent at the angle, *c*. Both the electric connections and the water-cooling arrangements were very complicated. Thus, along the outside of the concave surface of the round tube two triangular tubes were soldered on; these communicated together at the end-piece, *d*. A third

* Oberländer, 'Berlin klin. Wochenschr.,' 1879, No. 48.

metal tube was fastened in the same way between these two tubes. Into this latter tube a fourth one, insulated by means of a silk covering, was slipped. This fourth tube was for the wire connecting the battery and the

FIG. 6.



platinum loop in the end of the instrument, *b*. The platinum loop was protected by a piece of quill, *ee*. A telescope tube had to be pushed down the length of the instrument until it reached the window, *c*. The principal failings in the instrument consisted (1) in the complicated water-cooling apparatus; (2) in the sharply oval shape of this five-tube catheter; (3) in the quill piece being insufficient to protect the platinum loop from the water

in the bladder ; (4) in the non-transparency of the quill ; (5) in the fact that the quill was apt to get burnt by the heat just at that spot where translucency was needed ; (6) the window of the straight tube not being closed, the lenses of the telescope readily got soiled by the water in the bladder and impeded a clear view.

This, then, was Dr. Nitze's original cystoscope, but with it the interior of the dead bladder was able to be illuminated and demonstrated by Dr. Nitze to a meeting of medical men in October, 1877.*

It is thus evident that Dr. Nitze had carried out this idea of lighting up the interior of the bladder and of examining it by a special optical apparatus whilst it was thus illuminated.

The cystoscope was then entrusted to Mr. Leiter, who simplified and perfected the water-cooling arrangements, besides increasing the capabilities of the light. These improvements were at the cost of ten months of painstaking and expensive labour, which Dr. Nitze gratefully acknowledged before the Medical Society at Vienna.† On account of the prominence thus given to Mr. Leiter, the brilliant innovation of Nitze is recorded in the literature of that date as the Nitze-Leiter cystoscope.

The Nitze-Leiter Cystoscope of 1879.

Although this instrument is very similar in outward appearance to the Nitze cystoscope (Fig. 6), it differs very greatly from it in its internal arrangement. I shall therefore explain its construction in detail, and also describe here its necessary accompaniments, viz. the water-cooling apparatus and Bunsen battery, so as to

* Prof. Birch-Hirschfeld, who was present, remarked, on examining the bladder, that certain calculi which had been placed in that viscus for demonstration purposes were not vesical calculi, but gall-stones.—Nitze, "Nachwort," p. 308, 'Lehrbuch der Kystoskopie,' 1889.

† 'Wiener med. Presse,' 1879, No. 26.

FIG. 7.

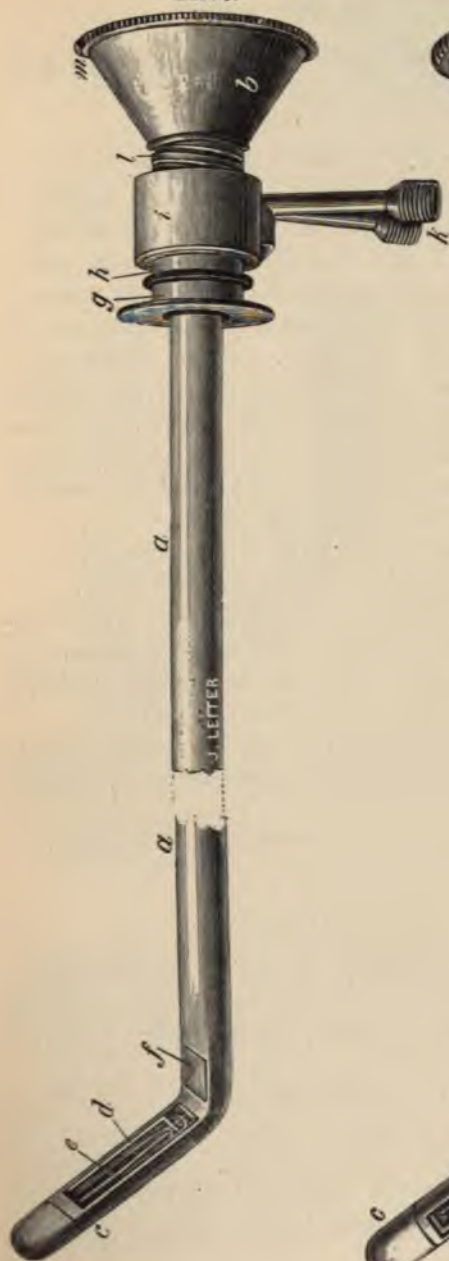


FIG. 8.



avoid repetition of these latter in the chapter upon the Nitze-Leiter urethroscope.

1. *The Cystoscope.*

This instrument has the form of a calculus sound, of 21 French catheter gauge, with a sharp elbow and a longish beak (Figs. 7 and 8). Two forms were made, one (Fig. 7) was for the examination of the neck, anterior wall, and sides of the bladder, and the other (Fig. 8) was for the posterior wall and base. These instruments, however, agree in form, and differ merely in the position of the light and the arrangement of the lens and windows. Thus, in Fig. 7 the light (*e*) and the window (*f*) are in the concavity, and in Fig. 8 the light and the window are in the convexity of the beak and elbow.

Both instruments are made up of three sections:

- A. The beak (*c*), which carries the electric lamp.
- B. The body or shaft (*a a*), which contains the telescope or ocular tubes and the water-cooling tubes, and conveys the insulated wire from the battery to the lamp. It is furnished with a window at the elbow (*f*).
- C. The ocular end (*b*), which is furnished with binding screws for the battery wires and funnels for the water reservoir tubes.

These sections have now to be considered in detail.

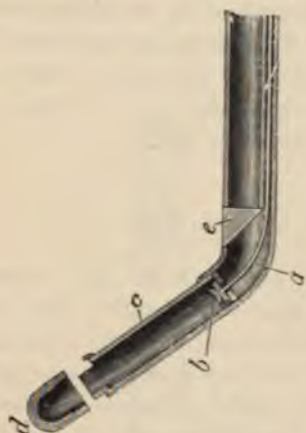
A. THE BEAK (Fig. 9).

The entire beak is occupied by the source of light—the platinum wire. The wire itself has been removed in Fig. 9 for the sake of clearness, but it is seen in Fig. 7 (*e*) or Fig. 8 (*d*).

The end of the wire rests upon the little cup, *b*, Fig. 9, and thus comes into connection with the battery by means of the insulated wire, *a*, Fig. 9. The other end is kept pressed against the inner wall of the beak, the wall forming a conducting path for the current and thus completing the circuit.

This platinum wire lamp is almost surrounded by a water compartment which is formed by the junction of the two water canals passing along the shaft. The beak has an elongated oval aperture in it 20 mm. long (Fig. 7, *d*), for the exit of the rays of light emitted by the platinum lamp. The aperture is securely closed by a solid

FIG. 9.



piece of rock crystal. The beak terminates in a cup, *d*, Fig. 9 (Figs. 7 and 8, *c*), which can be screwed off and on in order to allow of access to the platinum wire.

B. THE SHAFT.

The shaft or body of the cystoscope is little more than five inches in length, and is of 21 French catheter gauge in size. It is divided into four compartments (Fig. 10). The largest of these is the centrally placed telescope tube, which extends from the window at the elbow to the ocular or external end. It measures 5 mm. across, and is provided with a system of lenses at either end and in the middle, like a microscope, for increasing the size of the image refracted through the window prism (*f*, Fig. 7; *e*, Fig. 9). Along one side of this

telescope-tube are placed two water canals or compartments (Fig. 10), which unite, as I have just mentioned,

FIG. 10.



in the beak. The shaft has, moreover, an insulated compartment for the conveyance of the conducting wire for the platinum loop. This is placed between the two water canals. The window is furnished with a prism (Fig. 9, *e*) to refract the entering rays of light directed along the shaft to the observer's eye.

C. THE OCULAR END.

The ocular end is furnished with the funnel-tubes (*h*, Fig. 8), which place the water canals and terminal compartments of the cystoscope in open communication with the water reservoir, so that a continuous stream of cold water could be made, under pressure, to traverse the length of the instrument, and effectually absorb the great heat emitted by the platinum loop when in action. The ocular end also possesses a grip or binding screw for the attachment of the connecting cords from the battery—one of these connecting cords is placed in contact with the insulated wire in the shaft of the cystoscope, and the other is attached to the metal wall of the instrument, which serves as the completer of the circuit.

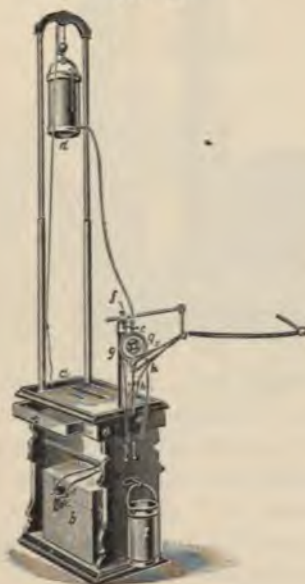
A small knob on the ocular ring serves to show the position of the beak.

2. *The Water-cooling Apparatus.*

The heat which was evolved by the platinum loop was so great that a water-cooling apparatus was absolutely indispensable. I have just described the channels through which the water may enter the cystoscope, traverse its shaft, surround the lamp, and pass off, after absorbing

the heat of the lamp, by means of an exit tube (Fig. 8, *h*). It is obvious, however, that a large amount of water pressure was requisite in order to obtain a continuous current of cold water through such narrow and tortuous tubes. To secure an uninterrupted flow the reservoir had either to be greatly elevated, or the water had to be driven up out of a tank placed on the floor by means of appropriate pressure. The former method was less complicated, and Fig. 11 shows the apparatus which was

FIG. 11.

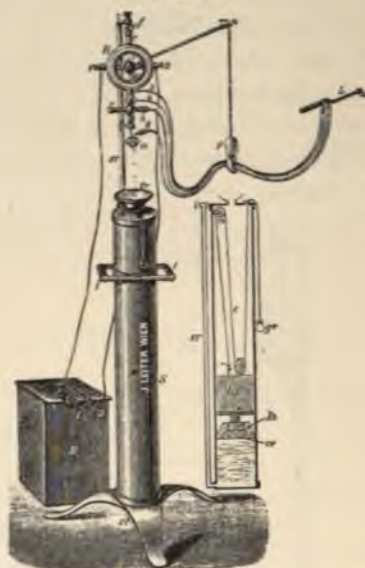


generally supplied. From the reservoir *d*, which could be raised or lowered by means of a pulley, the water was carried to *c*, where the force of the current could be regulated by means of a tap before it traversed the cystoscope or urethroscope (*i*). The outfall was allowed to drop into the receiver *l*.

A less cumbersome but more complicated water apparatus was subsequently made. It is represented in Fig.

12. It will be seen that the water in the reservoir was forced upward through the tube *i* by the pressure of a

FIG. 12.



heavy plunger weight *bg*. It will be observed that once filled, the reservoir was self-feeding, for the plunger weight is so valved that it offers no obstruction to the reaccumulation of the outfall from the cystoscope into the reservoir through the funnel *tr*. With proper adjustment the weight did not need to be raised oftener than once in twenty or thirty minutes.

3. The Bunsen Battery.

To obtain the necessary heating and illumination of the platinum wire, an equable constant current of a certain intensity was of course necessary. This could only be obtained from a large and cumbersome battery fitted with a rheostat. The best battery for this purpose was that furnished with Bunsen elements. It will be seen in Fig.

11, *b*. Seeing, moreover, that the platinum wire was easily fused if too strong a current was passed through it, a current regulator or rheostat (Fig. 13, or Fig. 11, *g g*) was indispensable.

FIG. 13.



This battery had to be refilled before, and emptied after every operation. Its smell was often distressing.

The ease with which the platinum loop was fused, even in skilled hands, and with the additional protection of a good rheostat (Fig. 13), can be gathered from a letter which Mr. Schall wrote to the 'Lancet' on February 11th, 1888. Mr. Schall had to repair the platinum loop of a

cystoscope nearly every week for two years. The instrument belonged to a distinguished German specialist, who persevered in its use, and though well skilled in galvanic technique could not avoid the almost weekly fusion of the wire. The instrument, therefore, was rarely out of the hands of a skilled mechanician.

The Capabilities of the Nitze-Leiter Cystoscope.

Directly the Nitze-Leiter cystoscope appeared, its fame spread far and wide. Professional men in every civilised nation hastened to accord it a fair trial. Some wrote an account about its powers, others exhibited the instrument; few, however, persevered in its use.

Dittel, Nicoladoni, Ultzmann, Maas, and Oberländer all spoke warmly in its favour. Sir Henry Thompson brought it before the Royal Medical and Chirurgical Society in England. Roswell Park advocated its use in America.

Sir Henry Thompson, whilst demonstrating its use upon a patient at the Royal Medical and Chirurgical Society,* spoke with but little enthusiasm of its powers, and plainly indicated its greatest defect in saying "that he was indebted to Mr. Weiss for his intelligent and careful management of the apparatus, since it was essential for this, as well as for its maintenance in good working order, that it should be under the care of a person well versed in the use of galvanic apparatus, and competent to adjust or repair if necessary the very delicate details which formed the essential parts of this somewhat complicated but very complete instrument." It was evident that an instrument which needed the constant supervision of a skilled mechanician would find but little favour with practical surgeons, and Sir Henry Thompson struck the key-note of its subsequent disfavour in the words I have just quoted.

In a lecture on the "Diagnosis of Surgical Urinary

* 'Lancet,' p. 529, April, 880.

Disease,"* Sir H. Thompson gave his opinion upon the instrument in the following words:—"There are some morbid conditions the existence of which we sometimes suspect, but cannot positively affirm to exist, whose presence may now be ascertained through the agency of the new endoscope (the Nitze-Leiter). I refer to the identification of sacculated stone as the cause of persisting and unrelieved symptoms; to the detection of pedunculated growth, and of villous disease of the bladder removable by operation; and, lastly, to the investigation of the nature of foreign bodies other than calculi which have become lodged there. All these cases are, however, more or less rare; nevertheless *it is our duty*† to be provided with every resource, whatever it may be, which enables us to deal more effectively than heretofore with conditions on the management of which grave issues depend. . . . I have lately seen a fatal case of vesical growth which might have been easily removed by operation; in such a case the new endoscope may possibly render essential service."

Unfortunately, however, the Nitze-Leiter cystoscope does not seem to have fulfilled the expectations which were thus raised in England. In a series of forty-three cases of obscure vesical disease which commenced in 1880, and which comprised twenty cases of vesical growth, Sir H. Thompson does not *once* make mention of having used the endoscope which he had in his possession, but states that he resorted to digital exploration for diagnostic purposes.‡

We learn also from other sources that another Nitze-Leiter instrument was obtained by Khroné and Sesemann, of Duke Street, W., that it was tried at a hospital and returned the second day afterwards with the platinum wire fused, and a note to the effect that the instrument was too complicated for practical purposes.

* 'Lancet,' December 6th, 1879, p. 823, pl. ii.

† The italics are our own.

‡ 'Tumours of the Bladder,' 1884.

John Weiss and Son write* also to the 'Lancet,' February 4th, 1888, to say that they have still the original instrument shown at the Royal Medical and Chirurgical Society in 1879 in their possession.

The reason why the Nitze-Leiter cystoscope failed to receive recognition will be realised by anyone looking at Fig. 11 or 12. Its cumbersomeness can thus be estimated at a glance. I have said sufficient to prove its extreme complication, and it only remains for me to add that its working was decidedly fickle and its cost considerable.

THIRD PERIOD.

The Incandescent-Lamp Cystoscope of 1887.

At the time of the construction of the Nitze-Leiter cystoscope of 1879 the Edison incandescent lamp had not been patented; and although even when the construction of the latter had been made public, and its employment as a source of light in endoscopy had been fully recognised and made use of in the specula for the throat, nose, ear, and rectum, yet it was not until 1887 that the incandescent-lamp cystoscope for the *male* subject made its appearance. It is difficult to understand the reason for this delay.

Dr. Newman, of Glasgow,† in 1883 had devised and used an electric endoscope for the female bladder, and found when the bladder was well illuminated the orifices of the ureters could be easily seen and catheterised.

Mr. Mayo Robson,‡ in 1885, had also introduced a small half-candle Swan electric lamp into a female bladder through the dilated urethra, and had thus illuminated the interior and displayed a carcinomatous growth.

* 'Lancet,' "Electric Illumination of the Male Bladder."

† 'Glasgow Med. Journ.,' August, 1883; also 'Lectures on Surgical Diseases of the Kidney,' 1888, p. 415.

‡ 'Lancet,' August 22nd, 1885, pt. 2, p. 341.

In March, 1887, two incandescent-lamp cystoscopes appeared before the public almost simultaneously,* one after the design of Dr. Nitze, made by Hartwig of Berlin, the other emanating from the firm of Leiter of Vienna. Although these two instruments are the same in principle, yet they differ somewhat in detail. These are the models of the present day (1900) cystoscopes, so that a brief description of these will not be out of place here.

The Nitze Incandescent-Lamp Cystoscope of 1887.

The instrument retains the appearance of a short-beaked calculus sound of 22 gauge (French) in size. Three parts of it demand explanation.

The Beak.—The beak is short, and contains the small incandescent lamp. The tip of the beak is in the form of a hollow silver cap (G S, Fig. 14), which has a small oval slit in it for the passage of the rays of light. This slit is only covered in with the thin glass of the lamp. The cap fits on to the body of the beak, S screwing into S'. Into this hollow cap a small Edison or Swan incandescent lamp is cemented. One terminal of the carbon filament comes into contact with the insulated wire W when the cap is screwed home; and the other terminal becomes connected at the same time with the outer wall of the cystoscope, which serves as one of the conducting paths to connect the lamp with the battery. It will be realised that the carbon filament is burning naked in a globe, and lacks a rock-crystal window (*vide* p. 27). Should the filament burn through, the tip has to be sent to the instrument maker for repair. Generally the operator has two or more silver tips all armed with the carbon filament soldered in and ready for use, so that if one fails another can be screwed on immediately.

The Shaft.—A glance at the figure (Fig. 14) will show

* Nitze, 'Illustrirte Monatsschrift der ärztlichen Polytechnik,' March, 1887; Leiter, 'König. Gesellschaft der Aerzte zu Wien,' March, 1877.

that the calibre of the shaft of the cystoscope is no longer encroached upon and diminished by water-cooling compartments as in the Nitze-Leiter of 1879. It is given up almost entirely to visual purposes, and forms a hollow

FIG. 14.



This figure is taken from Nitze's article.

tube furnished with a system of lenses for increasing the size of the object examined.

Rays of light from the object under examination enter the window situated at the bend of the elbow, are refracted by the prism P (Fig. 14), closing the window,

and, passing through the system of lenses just mentioned, are perceived by the observer's eye.

It will be noticed that the window and the light are in this instrument placed upon the concavity. There is another in which the light and the window P are placed upon the convexity, as in the 1879 instrument, but here the window is closed with glass and has no prism.

The Ocular End.—The end at which the observer's eye is placed has an arrangement for connecting the battery wires with the insulated wire W (Fig. 14) and the outer wall of the instrument. A slot under the management of the thumb serves as a "key" for opening and shutting the circuit.

Dr. Nitze also invented another cystoscope, in which the window was situated not at the elbow, but on the front of the *beak* itself. It is still used for cases in which an enlarged prostate is encountered.*

Leiter's Incandescent-Lamp Cystoscope (1887 pattern).

The cystoscope produced by Joseph Leiter, of Vienna, was a reliable and highly finished instrument. It was very similar in appearance to the Nitze cystoscope, possessing, however, a longer beak, a shorter shaft, and a differently arranged ocular end. The two forms are represented in Fig. 15 (A and B).

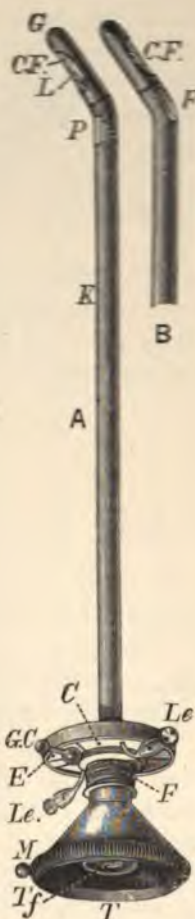
In A the window and the light are on the concavity, and in B the same are on the convexity of the elbow and beak of the instrument.

The Beak.—The entire beak (Fig. 15, G) is a hollow hood which can be screwed on and off the shaft of the instrument. It has a long oval aperture C F, covered in with a thin pane of rock-crystal. The hood G, when

* Nitze, "Beiträge zur Endoscopie," "Verhand. der Deutschen Gesellschaft für Chirurgie," p. 184, 1887. 16ter Congress.

screwed on, protects the small incandescent lamp. This "Mignon" lamp was fitted with terminals for insertion into two sockets, which are in direct communication, by

FIG. 15.



The two forms of Leiter's electric cystoscopes, A and B.

means of insulated surfaces, with the battery. For the last two or three years cartridge lamps have been supplied,

and the sockets replaced by a plate on a spiral spring (Fig. 16). Here we have a real practical point in the difference between the Nitze and the Leiter cystoscopes. In Nitze's, if a carbon filament burns through, we are forced to send the entire tip, *i. e.* an integral part of the instru-

FIG. 16.



The cartridge lamp. The socket.

The hood.

ment, to the makers for repair. But in Leiter's, if the same accident happens—and it does pretty frequently, for a strong light is always needed, and all small lamps are frail,—all that is needed is to unscrew the hood, jerk out the little lamp, drop in a fresh one, screw on the hood, and work can be recommenced after a pause of perhaps a couple of minutes.

These little incandescent lamps, so readily adjustable in the Leiter's instrument, cost about half the price of repairing the Nitze filaments.

At first there were other slight practical differences between the two models; time and experience have brought both to a level, and there is now but little to choose between the two.

Each surgeon will adopt the model he prefers; for my part I prefer one made for me by Leiter (Fig. 17). In it the beak is short, like that of a calculus sound. The ocular end is filled with a rotatory plate carrying the binding screws *c d*, whilst instead of the Nitze slot key a small screw (*b*) opens and closes the circuit and acts as a switch. By aid of the telescope a surface of three to four inches diameter can be seen at once. The size is 23 French gauge. An ebonite edging to the ocular rim prevents any escape of the current, which otherwise takes place when a metallic rim is touched by a sweaty eyebrow.

A Child's Cystoscope.

For some years I have used occasionally a very small cystoscope, made for me by Leiter, for male and female

FIG. 17.

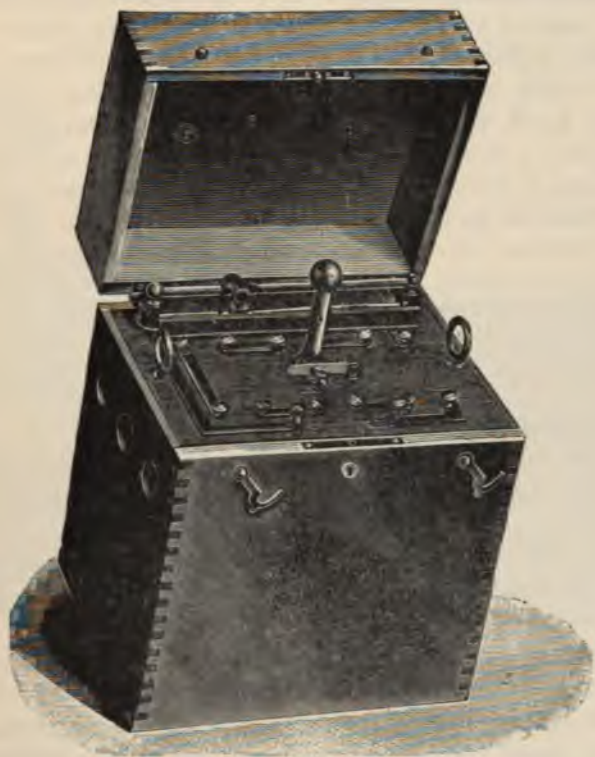


children and for the renal pelvis. It is merely a very small calibre cystoscope (No. 6 E gauge). Its visual apparatus is perfect, but it is of course restricted in its field.

Batteries.

For those who are not using electric light in the house perhaps the most reliable form of battery will be found to be an ordinary six-cell bichromate plunge battery (Schall),

FIG. 18.



with a convenient lever arrangement for immersing the carbon-zinc elements in the fluid (Fig. 18). It *must* be fitted with a rheostat, to regulate the strength of the current to the strength of the lamp. If the battery be without one, constant failure is certain, and endless annoyance and expense is incurred.

This battery is stated by Schall to give a *perfectly steady*

light for three or four hours, and may be used for all lamps requiring between 4 and 11 volts and 0.4 to 1.5 amperes. Lithioides fuses prevent the spilling of the acid, and the battery can easily be recharged and kept in order for many years without the help of an electrician. It is specially useful for surgeons using incandescent lamps as operating light, and for surgeons being abroad.

I cannot recommend the Leclanché dry battery for electric light. Its staying power is disappointing, and its weight is decidedly against its portability. On the other hand, there is no *noise* or spilling due to changing the acid. For those who are near charging stations nothing, in my opinion, is better, handier, or cleaner than a Lithioides accumulator (see Batteries for Travelling).

For those who can command electricity from the street mains the matter is greatly simplified both for the consulting room and for travelling.

A. FOR THE CONSULTING ROOM.

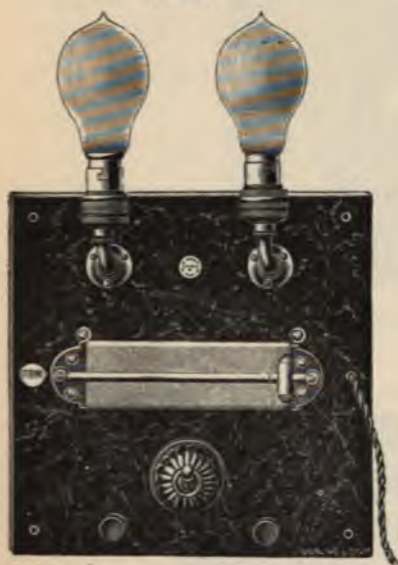
There exist two kinds of current which may be used for lighting up houses, the continuous and the alternating, and the apparatus required for utilising them differ considerably.

In some districts they supply the continuous or low tension current, the electro-motive force of which varies between 100 and 250 volts. This kind of current suits every purpose for which electricity in medicine and surgery is required, i.e. for galvanisation, electrolysis, faradisation, cantery, surgical lamps, running motors, exciting spark coils for Röntgen rays: I should advise the surgeon to select this kind, if possible, for he can then charge small accumulators for carrying about with him.

In other districts the current supplied is oscillating rapidly, and changes its direction or polarity many thousand times per minute. This is called the *alternating* current. Its advantage for the electric light companies lies in the cheaper distribution. The electro-motive force in the

mains in the street is between 2000 and 5000 volts, and with so high an E. M. F. fifty times as much electricity can be sent through a conductor of given diameter than would be possible with an E. M. F. of only 100 volts. The cables can therefore be made much thinner, but the insulation has to be more efficient. When brought into a house the alternating current passes through a trans-

FIG. 19.



Schall resistance for the continuous current.

FIG. 20.



Schall transformer for the alternating current.

former, which reduces this high E. M. F. to 100 volts, in a few cases to 200 volts. On account of the continuous reversal of direction this current *cannot* be used for galvanisation, electrolysis, or charging accumulators; it is, however, much more convenient than a continuous current for cautery and surgical lamps. In either case the surgeon needs a Schall resistance or a transformer (Figs. 19 and 20), which will permit of a steady light for the smallest cystoscope lamp.

B. FOR TRAVELLING.

I have for some years used a small, portable Litanode battery for travelling. It affords a constant strong light

FIG. 21.



Secondary battery, accumulator storage battery.

FIG. 22.



for at least a quarter of an hour's cystoscopy. I charge it myself by switching it on to a plug in my consulting room.* It has never failed me, and its portability is such that it can be slipped into a small pocket of an operating bag. All that is required is an extra "feed" before a long journey is undertaken, and an occasional addition of weak acid to the cells. Larger batteries are supplied by the same company, who recharge them if required. One very useful battery combines the cautery and the light (Fig. 22).

* For hints and rules for charging the lithanode batteries *vide* Appendix A.

CHAPTER II.

ESSENTIAL MODIFICATIONS IN THE INCANDESCENT-LAMP CYSTOSCOPE OF THE 1887 PATTERN.

As the incandescent-lamp cystoscope became more widely known and more generally employed, attempts were made on all hands not only to increase the accuracy of its visual power, but also to extend its use beyond that of an exploring instrument.

It would be burdensome and useless to recall these efforts in detail. Suffice it to say they tended towards the accomplishment of four objects :

1. To add to it an efficient bladder irrigator to clear the medium—**irrigating cystoscopes.**

2. To adapt mechanisms for operating in the bladder under control of the light—**the operating cystoscope.**

3. To arrange catheters for entering the ureters and drawing off the contents of the renal pelvis—**the ureter-catheterising cystoscope.**

4. To secure permanent and accurate records of the visual appearances of the mucous membrane by means of photography—**the photocystoscope.**

All these efforts have been successful, mostly owing to the untiring energy and skill of the innovator, Dr. Nitze, whose lead has been assiduously followed by friend and rival alike.

1. Irrigating Cystoscopes.

Dr. Brenner was, perhaps, the earliest in the field with an irrigating instrument of Leiter's pattern. It consisted, as Fig. 23 will show, of a small tube soldered on to or incorporated with the shaft of that form which used to

FIG. 23.



The Brenner irrigating cystoscope.

be advocated for viewing the posterior wall. The irrigating channel runs from a tap at *H* to an opening below the window; *M* is the stylet for the same, and *K* a catheter in position, which Dr. Brenner conceived would be useful for entering and catheterising the ureters.

It is unpractical for irrigation, as are all other similar instruments, whether fitted to the anterior or the posterior wall cystoscopes. The channel is too fine, and gets clogged with plugs of mucus or blood. Berkeley Hill's, Nitze's, and Fenwick's irrigating cystoscopes are all open to this objection, but any of them may prove of occasional value in the hands of the expert in carrying out two or three manœuvres of prognostic importance. The first consists in examining the suppleness of the mucous membrane by watching the infolding of the surface as the water is allowed to trickle away; the second, in estimating in the same way the *depth* of a growth or the attachment of a given tumour—if, for instance, it slides with the mucous membrane, or remains fixed when the bladder contracts; and lastly, in directing a jet of water against any small tumour we are able to ascertain, by the amount of motion or oscillation thus communicated to the body, whether we have to deal with a pedicled or a sessile growth—a somewhat important element in deciding our future treatment.

The best of all irrigating cystoscopes is one in which a straight cystoscope passes along the centre of a catheter, the lamp and prism appearing at the eye of the catheter when the cystoscope is thrust home.

Dr. Güterbock,* taking, I believe, the idea from Boisseau du Rocher's megaloscope, had an irrigating cystoscope constructed on this principle, and found it of value. The instrument (Fig. 24) has the following components:

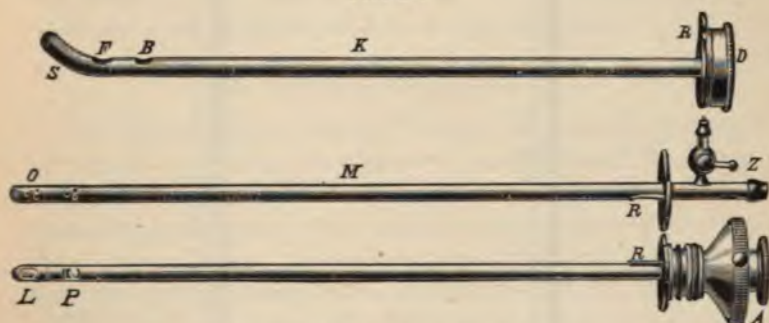
A long catheter *K*, with two openings *F*, *B* on the convexity of the beak; *M*, an internal tube, which is pushed inside the catheter *K*, until its openings *O* correspond to the openings *F* and *B* of the outer tube, and a straight

* Güterbock, 'Berl. klin. Wochenschrift,' 1895, No. 29.

cystoscope *A*. The bladder to be examined is washed out by means of *K* (*M* being inside), and is filled with clear medium. The inner tube *M* is withdrawn, and replaced by the straight cystoscope *A*. When home, the lamp *L* and the prism *P* open on to the windows *F* and *B*.

The advantage is obvious, but the optical apparatus is not of course of the same calibre as that used in the ordinary cystoscope. Without knowing of this device, I had made for me by Leiter an instrument to use in cases of enormous prostates, whereby I could wash out the bladder through a supra-pubic puncture (page 46). The step from this to using a curved tube instead of a

FIG. 24.



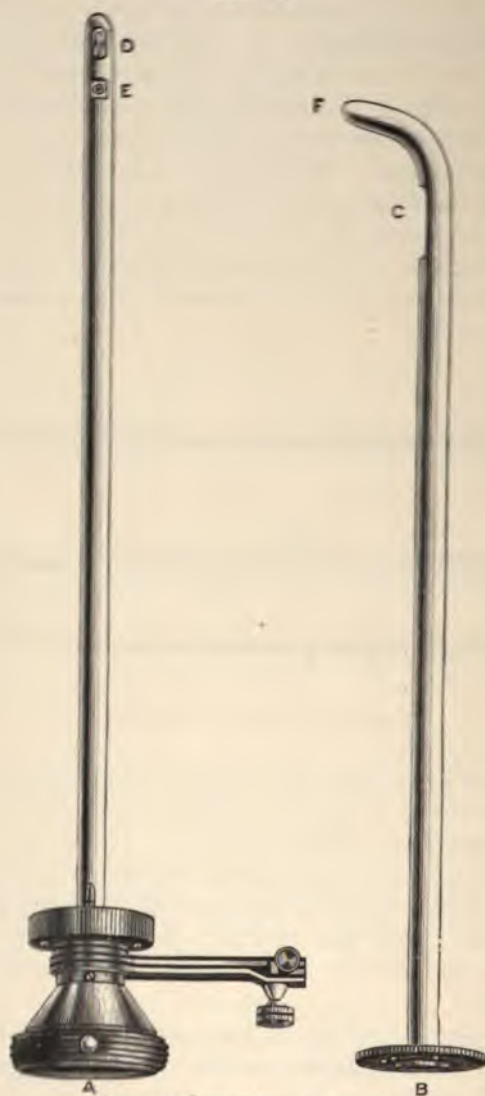
Güterbock's irrigating cystoscope.

trocar tube was an easy one, and my irrigating cystoscope (Fig. 25) which I have now used for some years is almost the counterpart of Güterbock's.

It is one which I can strongly recommend to the profession as being the best for cases of enlarged prostate, or for those in which a profuse *renal* hæmorrhage has to be removed before the source of the blood can be ascertained.

The catheter *B F* (Fig. 25) has a large open eye *C*, which is closed on the introduction of the instrument by a snugly fitting india-rubber or linen-web catheter, the eye of the latter opening out at *C*. The bladder is then well washed

FIG. 25.



Fenwick's irrigating cystoscope.

out by simply attaching a reservoir or a syringe to its end B. When the bladder is clean and full, the inner catheter is quickly withdrawn, and the cystoscope A E D thrust home; the lamp D and prism E open out at the eye C of the outer catheter. By its means I have often made a rapid and easy diagnosis of the side whence a profuse renal hæmorrhage was issuing. In some cases where much clot is encountered, as in renal growth, I do not use the inner catheter, but suck out the clots by means of a syringe, the exhaustion power of the syringe causing the clot to be cut up by the sharp edge of the eye C. Great care and gentleness is needed in the clot-cutting to avoid the mucous membrane being sucked into and wounded by the sharp-edged eye. It is always wise to suck out only as much fluid as is first injected.

2. Operating Cystoscopes.

In 1891 Dr. Nitze claimed* that by means of a variety of operating cystoscopes which he had elaborated, he could apply concentrated lotions to any particular section of the mucous membrane of the bladder without damage to the surrounding areas; that he could cauterise with a galvanocautery morbid changes and sessile growths; could snare polypi and cut them off either with a cold or heated écraseur loop; could tear off broad sessile growths; or deal with foreign bodies or small stones or fragments of stone.

A review of the progress of cystoscopy, however brief, would be incomplete without a reference to these conceptions. I have, therefore, briefly described them for the consideration of the reader. As examples of ingenuity and thought they will not easily find rivals in our surgical armamentarium, though it must be admitted that few surgeons will care to work in so hampered a field, and that fewer still will possess that happy dexterity which is indispensable for their safe and successful employment.

* Nitze, 'Centralblatt für Chirurgie,' No. 51, 1891, p. 993.

The Nitze Operation Cystoscope.

Figs. 26 and 27 show a cystoscope with cutting pincers, by means of which small polypoid growths of the mucous membrane can be removed. The picture almost explains the mechanism. A tube, *a a*, is so arranged outside an ordinary Nitze cystoscope that it can be moved forwards and backwards. The component parts of the pincers are affixed to this tube, and moved at will by means of the lever *b*. The instrument, before introduction along the urethra, is closed, as in Fig. 27, by pushing the outer sheath forward.

Criticism.—The objection I raised to this instrument was—even supposing the surgeon skilful enough to have seized a villous papilloma and pulled at it and torn some of it off—that probably only one tug could be taken under control of the light. The consequent bleeding has to be dealt with, and this is often smart, and the cystoscope is at once in a red fog of blood, which, in my experience, will take a few days before it can be sufficiently arrested for clear cystoscopy. By that time some swelling of the mucous membrane will have ensued, and perhaps lime phosphate will have been deposited on the remainder of the growth. My own feeling was and it still remains, that if a growth has to be operated on at all it must be done thoroughly by cleanly resecting the base through a supra-pubic opening. Hence this instrument can only be of use in that small and limited class of long and thin pedicled villous papillomata, in which class it is conceivable that the supra-pubic incision may be avoided by twitching away the tumour by an operating cystoscope.

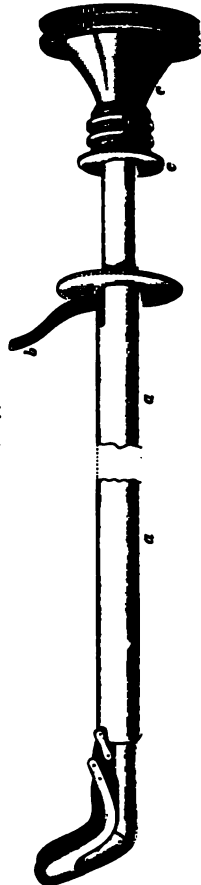
The Nitze Galvano-cautery Cystoscope.

It is thoroughly understood, remarks Nitze, that the continued and close application of the beak of the cystoscope to the mucous membrane may produce a severe burn, even though the bladder be full of water (*vide*

FIG. 26.



FIG. 27.



The Nitze operating cystoscope, 1891.

page 66). How severe such a burn may be is well illustrated by a case which he alludes to, in which a deep burn of the tissues of the trigone, the size of a farthing, was caused by the cystoscope being thus unskillfully used. It was only after the lapse of six weeks, and recurrent profuse hæmorrhages, that the slough separated and the burn healed.

Nitze has imitated this cauterant effect of a heated beak by constructing a cystoscope shaped like a lithotrite (Fig. 28). The female blade *AA* is a hollow shaft carrying the cystoscope and a lamp (*a*). The male blade *B* slides bodily over the female, and carries on the summit of its beak the galvano-cautery (*c*), which consists of a platinum coil upon a porcelain disc: the handle of this instrument has binding screws attached to it for affixing the cables from the battery. There is also a water-cooling system.

This instrument is obviously of use in skilled hands to cauterise those small secondary splashes of villous papilloma which are often seen around the main growth, and are sometimes difficult to remove by supra-pubic cystotomy.* It is also of value for recurrent growths of small size and for indolent solitary ulcers. The danger would consist in underheating or overheating the coil. Underheating means a surface burn, an increased congestion, and an increased activity. Overheating might lead to perforation of the coats of the bladder.

*The Nitze Écraseur Cystoscope and the Electro-cautery
Écraseur Cystoscope.*

A glance at the figures, 29 and 30, will convey to the reader better than any detailed description, the mechanism of these two instruments—the cold loop and the hot loop écraseur cystoscope. It will be realised how sadly the heavy end, loaded with screw and water-cooling tubes, must militate against that delicate manipulation which is so essential to the accurate snaring of vesical growths.

* Unless a caisson is used.—Author, 'Brit. Med. Journ.,' p. 1111, November 19th, 1892.

FIG. 28.



The Nitze galvano-cautery cystoscope.

FIG. 29.



FIG. 30.



The Nitze hot loop cystoscope.

Believing these instruments need to be much lighter to render them more practical, I take the opportunity of making of Casper's operation cystoscope, which, to my mind, approximates more nearly to the needs and necessities of these non-resect operations which are carried out through the natural orifice of the eye.

The Casper Operation Cystoscope.

Following upon Nitze's lead, Dr. Casper planned an operation cystoscope in which all these instruments of Nitze are combined. Thus there is the straight cystoscope Fig. 81 made like Chamberlain's Fig. 24, A. This is made so slide along inside and so project from the end of a number of sheaths bent at the end like a Mercier's catheter. Each sheath has its separate function. There is a galvano-caustic made of a porcelain button round which is coiled a platinum wire Fig. 82: this is affixed to the front end Fig. 82, F. The galvano-caustic wires are brought to K. Fig. 82 is the sheath of the cold and galvano-caustic catheter; the loop is not shown. Finally, Figs. 84 and 85 show the instrument without and with its central cystoscope. The advantage, to my mind, of Casper's instrument over Nitze's consists in the lightness and absence of complicated mechanism: also in the fact that the bladder is easily washed out through the open sheaths.

Feinberg's Sigmoidoscope, Trocar, and Cystoscope.

In some rare cases of hard and irregularly enlarged prostates where the cystoscope cannot be introduced, and where the sound does not reach the depth of the post-prostatic pouch—the calculi are sometimes so deeply fixed behind and below an unraised median lobe or collar that the sound introduced per urethram cannot reach them, however much rotated it is, or however forcibly it is thrust toward the base over the lobe—I have used a trocar cysto-

FIG. 31.



FIG. 32.



FIG. 33.



FIG. 34.



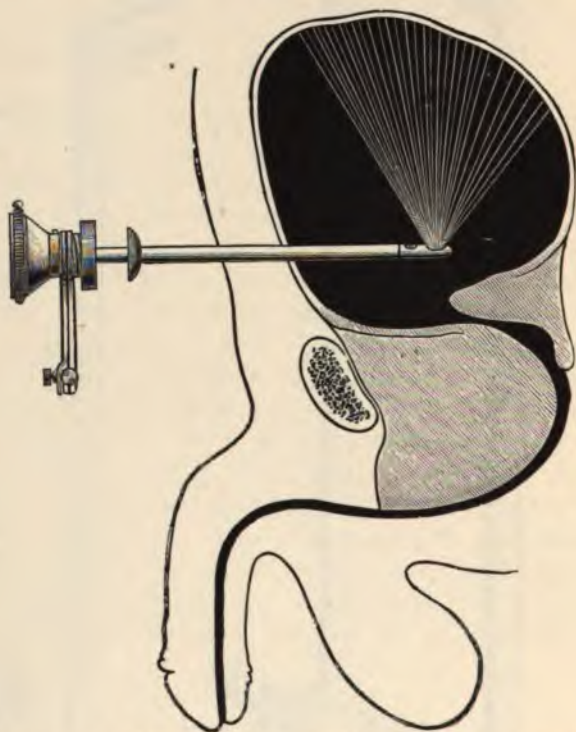
FIG. 35.



Casper's combination operating cystoscope.

scope made for me by Leiter. By means of this I believe that harmful pressure is avoided and the chance of cysto-pyelitis and hæmorrhage lessened. It consists of a straight supra-pubic trocar, such as is used for

FIG. 36.



Examination of bladder with Fenwick's supra-pubic cystoscope.

tapping the distended bladder; the trocar can be replaced by a straight cystoscope. It is employed as follows. The trocar and cannula is thrust supra-pubically into the full cleansed bladder, the trocar is withdrawn as the urine or medium is flowing, and replaced by a cystoscope for examination of the wall or by a loosely fitting blunt pilot. By means of this the bladder wall is examined (Fig.

36), or its base behind the prostate is carefully prodded (Fig. 37) to ascertain the absence or presence of stone. If the examination proves the absence of stone and growth

FIG. 37.



Fenwick's method of sounding bladder with supra-pubic trocar.

the cystoscope or the pilot is withdrawn, and replaced by a Jacques catheter to rest the bladder by permanent or temporary drainage. It is obvious that the use of this instrument is greatly restricted, and the main object is to prevent unnecessary supra-pubic cystotomy. After all due allowance is made for the ease with which the operation of supra-pubic cystotomy can be performed, and the absence of immediate danger, there is much against its employment in the aged or feeble, for it is far more exhausting than a perinaeal cystotomy. On the other hand, supra-pubic drainage, carried out by a trocar, cannula, and tube, is often of real benefit and much comfort. This is more especially in the hard carcinomata of the prostate, a class in which the operation of perinaeal cystotomy is

decidedly bad surgery for the following reasons. The carcinomatous tissue is laid open by the knife and exposed to the drainage of an inflamed bladder, and the compression of the perinæal drain-tube upon the tough unyielding cancer evokes indescribable agony. An old gentleman came to me with great frequency, profuse recurrent hæmorrhage, and perinæo-anal pain. There was much urethritis from the constant use of a catheter. The prostate was rather hard and irregular. I examined the bladder with the trocar cystoscope, and found secondary nodules of growth on the anterior wall and around the orifice of the urethra. I withdrew the cystoscope and thrust a Jacques along the cannula and withdrew the cannula over this; this gave great relief. It was left in six days before it was changed. He then wore it for prolonged drainage.

3. Catheterisation of the Male Ureters under Electric Light.

On the introduction of the electric cystoscope it was foreseen that the next important step in the progress of precise urinary surgery would consist in an easy method of catheterising the male ureters. It was felt that once this manœuvre was rendered practical, much of the obscurity in surgical renal disease would disappear, many of the false impressions we still retain about the symptomatology of these disorders would be effaced, and the mortality of nephrectomy would assuredly be lessened. It was generally allowed that the female ureter was easily entered and traversed by a suitable catheter, guided either by the finger (Simon, Pawlik) or by the eye (Newman, Hirst, Hamill, Kelly,* Goldschmidt), but the disappointment caused by the failure of Brenner's instrument in 1889 (*vide* page 34) had rendered us sceptical as to the possibility of guiding an instrument into the male ureter under electric light.

This manœuvre is now, however, possible, and has been

* For ureteral catheterisation of the female see Chap. IV, p. 75.

in active use for over three years. Not only is it practicable in most cases, but to the dexterous it is easy. It will probably be easiest to those who have studied the varying positions and aspects of the ureteral mouths under electric light, and to those who have become adepts in guiding fine bougies along the electric urethroscope over the mouths of false passages through the strictured male urethra into the bladder.

The Instruments.

Several forms of catheterising male cystoscopes are before the profession, but as yet they fall mainly under two patterns—the Nitze and the Casper. As will be seen from the accompanying Figs. 38 and 39, both consist in a cystoscope with its usual electric lamp L, its prism P, and its telescope. Attached to one side is a channel for the catheter c to run in. This is so placed as to allow the point of the catheter to emerge into the bladder under the eye of the operator. He is thus able to guide it into the mouth of the ureter.

Meyer, of New York, gives the following rules for the use of the Nitze pattern :

1. Wash and cocaineise the bladder according to well-known rules.
2. Fill the bladder with from five to seven ounces of clear fluid.
3. Introduce the instrument. For this purpose the ureter catheter should be pushed down to the internal opening of the canal of the cystoscope; the lid of the latter should be pulled out about one third of an inch.
4. As soon as the beak has entered the bladder, the catheter should be pushed gently forward into the vesical cavity by about half to three quarters of an inch, and then the lid should at once be pushed back into place, *i. e.* it should be fully closed.
5. After the interior of the bladder has been satisfactorily inspected, and the ureteral openings have come into view, approach one of them.

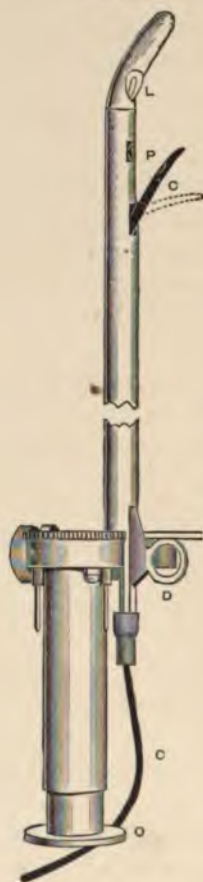
6. Let the ureteral opening appear at the very end of the cystoscopic picture, farthest away from the middle of the bladder, but keep it under your direct inspection, with the prism as near to it as possible.

FIG. 39.

FIG. 38.



The Nitze male catheterising
cystoscope.



The Casper male catheterising
cystoscope.

7. Push the catheter gently forward; if the beak's direction is a proper one, *i. e.* if it is parallel with that

of the lower end of the ureter, the ureteral catheter will almost invariably easily enter the mouth, when conducted by a trained hand (Fig. 40).

8. Allow the catheter to proceed not more than one or two inches into the ureter, and withdraw the wire mandrel. Then, as a rule, urine will begin to flow drop by drop at intervals or continuously.

For my own part I work the Casper without difficulty, and prefer it because the point of the catheter can be so easily manipulated through a large angle by pressing on the ring *D* (Fig. 39).

This instrument is introduced into the bladder, the catheter lying hidden in its channel. The mouth of the ureter selected is brought into view, and the catheter is pushed along its groove until its point is seen to emerge. A little movement of the cystoscope itself, or manipulation

FIG. 40.



The Nitze catheter entering left ureter.

of the ring *D*, to alter the angle, or a slight rotation of the catheter, is sufficient to guide the latter into the

mouth of the ureter (Fig. 41), and it can now be watched swelling up the wall of the bladder as it passes up the ureter. In a few seconds urine will drop from

FIG. 41.



Cystoscopic picture of a Casper catheter entering mouth of right ureter.

the end of the catheter, and may be collected in a test tube. It is best to give the patient plenty of fluid some time before the examination in order to excite the renal function. I have for long relied upon half a bottle of Contrexéville water taken an hour before exploration. Cocaine is ample in most instances when the urethra is tolerant and capacious. If an anæsthetic is needed, chloroform is perhaps more suitable, as it interferes less with the rapid secretion of the kidney than ether (?)

Albarran has lately invented a catheterising male ureter cystoscope in which a light metal finger regulates

FIG. 42.

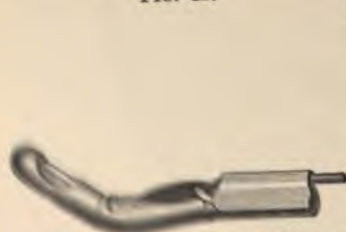


FIG. 43.



Beak of Albarran's ureter cystoscope.

the movement of the point of the catheter (Figs. 42 and 43). Probably each surgeon will choose the pattern which he finds most suited to his fingers.

Several points of practical importance need referring to :

The Preparation of the Kidney for Catheterisation.

Whether we should advise patients to take a large amount of fluid before examination is still a mooted question in the opinion of Meyer. In the male he believes it to be a wise plan. In the male only one kidney can be drained at a time ; yet both should be catheterised at the same sitting. That is to say, we cannot generally leave the catheter first introduced into one ureter in place ; liberate it ; catheterise the opposite side, leaving the catheter there also in position, and remove the cystoscope.

In the male we are, therefore, limited for time ; the sooner the patient gets through the better. The more fluid he has taken before the examination the more rapidly his kidneys will work. Of course, due weight must be given to this point in drawing conclusions from the urinary analysis. However, as both kidneys have been subjected to greater work at the same time, mistakes can be avoided by a competent analyst.

The Place for examining the Patient.

I venture very strongly to dissent from the opinion of one surgeon who asserts that the examination can always be performed in the consulting room under cocaine. *Of course it may be done*, but not, I submit, with due safety. No harm can follow when there is little chance of inflammatory reaction (cystitis, pyelitis, suppression) resulting. Thus it will probably do no harm to catheterise ureters in one's room, provided the patient has not reached forty-five, the urine is quite clear, the kidneys are healthy, and that no tuberculosis of the urinary tract is present. But under such healthy conditions the procedure is not called for.

It will probably be found that those patients who really need ureteral exploration for obscure disease possess kidneys too sensitive to ureteral or urethral shock to permit any risk of a subsequent chill being run. The immediate and remote death-rate due to washing out the bladder in cases in which pyelitis or irritable explosive kidneys co-exist is sufficiently high to discourage anyone from washing out that viscus in one's consulting room for the first time—a requisite in catheterising ureters; in fact, from doing so at all, except under the most favourable circumstances of rest and warmth.

If the ureter has to be explored, let it be done with care and caution, let the patient be in bed, and remain there quietly for a few hours after the examination.

The Recognition of the Ureteral Mouths.

(a) In rare cases it will happen to the reader that he will be unable to find one ureteral orifice in its proper position at the extremity of the interureteral bar; the surface is smooth, but on searching further backwards and outwards he may discover an irregular red-edged orifice. Fine folds of mucous membrane lead away from it, and it is obviously pulled out of position. Probably this will prove to be a case of chronic descending tuberculous ureteritis. In such cases the ureter seems to shorten and pull the orifice backwards and upwards.

(b) In other cases ulcers due to tuberculous ureteritis, or due to the irritating urine from chronic pyelonephritis with phosphatic-covered renal stones, obscure the edges of the orifice.

(c) In a few instances I have failed to find any ureteral orifice at all, and on operation or post mortem have found in these cases either a disused kidney and ureter (three cases) or no kidney (two cases).

Rapid Detection of the Site of the Ureter Mouth afforded by staining the Efflux with Aniline Drugs.

When the bladder base is much swollen or the ureteral orifices are displaced, or the kidney is sluggish, or herniæ of the mucous membrane co-exist, difficulties may arise. In detecting the mouths of the ureters under these circumstances the value of a stain for the urine will be obvious. I have for some years made use either of fuchsin * or of methylene blue (1½ gr. in pill). These, if taken an hour or so before the examination, will colour acid urine a delicate pink, or vivid green, or blue, so that after the bladder has been washed out streams of coloured urine will be seen to issue from the ureters.*

Differential Estimate of the Work done by each Kidney.

With reference to finding out the amount of work done by each kidney within a given time, it was suggested to count the drops that were discharged through the ureter catheter in a certain number of seconds. Meyer has discarded this method since he distinctly saw jets of urine at the ureteral opening enter the bladder with the ureter catheter *in situ*. The urine evidently often drains alongside the catheter besides passing through its lumen. The catheters which accompany Nitze's ureter cystoscope, says this author, are of more use in this respect than those of Casper's instrument. "The former have an end hole behind a scoop-shaped lengthening of the material of which the catheter is made, the whole thus forming a sort of bougie." The latter carry the eye at the side. Nevertheless, timing the ureteral efflux by means of an

* Fuchsin does not affect some kidneys at all, and others which are undoubtedly weak pass a good deal of the colour through. Some years ago I hoped to be able to test the efficiency of the secreting cells by means of fuchsin, but extended experience showed me the test was unreliable.

ordinary cystoscope is a valuable indication of renal function, and one which I never omit to carry out.

Difficulties in passing the Ureteral Sound the entire way to the Pelvis of the Kidney.

To the uninitiated the chief difficulty of this procedure might seem to rest in engaging and traversing the

FIG. 44.

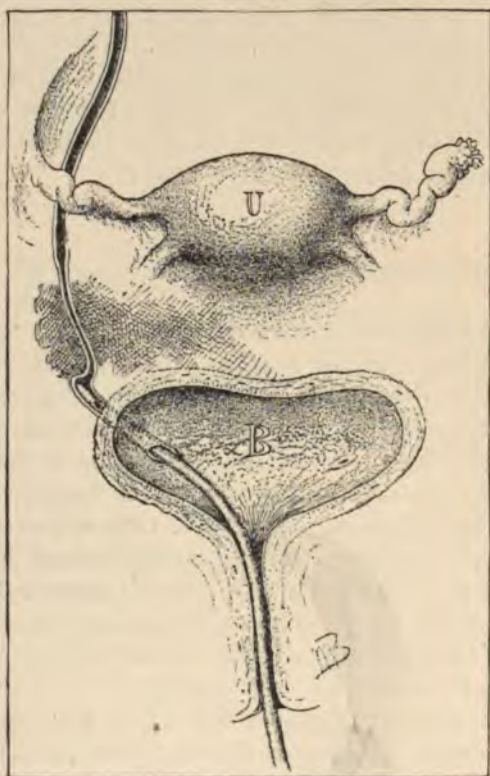


Diagram showing ureteral catheter checked by uterine carcinoma (Kelly).

ureteral orifice. This is not always so. The ureter which one frequently has to catheterise is either atonic,

or dilated, or movable, or pressed out of position by some adjoining viscus or growth (Fig. 44), or even kinked, and the cystoscopist must be prepared to act very tenderly with the ureter if he meets with some soft obstruction in it. Withdrawing the catheter a little down the ureter, rotating it between the finger and thumb, and then gently pushing it on may prove successful. Occasionally he will have to give it up and allow it to lie in the lower third of the ureter and to carry off the fluid which descends to it from above. The golden rule is, the point of the catheter must not be pressed up against the obstruction. This manœuvre merely drives the eye under cover of the thin ureteral wall, and effectually blocks the orifice. If any difficulty is caused by the blocking of the catheter by blood clots or detritus from the kidney, it is readily overcome by withdrawing the catheter from the ureter and injecting boracic solution, so as to expel the obstructing plug into the bladder and by again introducing it into the ureter.

Sounding the Ureter and Kidney Pelvis for Stone under Electric Light.

Before the male ureter could be catheterised under the light, I used to have the female ureteral catheter tipped with metal for sounding the female ureter, for the fingers can detect by this means the presence of any small calculus in the channel of the ureter. Sounding the ureter is difficult in the male because of the many bends the catheter has to make, and the metallic edges it has to ride over in the male cystoscope; the gripping and friction of these tend to obscure the sense of touch. But there is no doubt in my mind that this is a step in the future.

The last modification of the cystoscope is that designed to photograph the interior of the bladder. It will be better to postpone the account of this instrument, the photocystoscope, until I deal with the methods for obtaining visual records of the pathological changes in the bladder (Chap. V, p. 85).

CHAPTER III.

THE TECHNIQUE OF THE INCANDESCENT-LAMP CYSTOSCOPE.

THE management of the instrument requires but little technical knowledge, but the power of gentle and *purposive* manipulation of the cystoscope when in the bladder can only be acquired by extensive practice. Those who are constantly in the habit of using the calculus sound and of passing solid steel bougies or metallic catheters will have nothing to learn in the actual introduction of the cystoscope into the bladder, for the latter is as easy as the former; but the pointing of the beak and due rotation of the instrument, so that a certain patch of the bladder wall may become illuminated and examined, requires a good deal of practice and some patience. It is wise to use the instrument freely on the dead subject first, for we gain thereby a more rapid knowledge of the capabilities of the instrument than we can expect to acquire on the living. The various little manipulative dodges of gently *placing* the light are also learnt. Leiter supplies a phantom bladder which is extremely useful if the mortuary subject cannot be obtained. This phantom has a small window at the top through which the interior of the bladder and the position of the light may be inspected. The eye can thus guide and teach the hand which is manipulating the instrument through the dummy urethra. Several blood-red irregular masses, made so as to resemble polypi, project from the wall, and one or two calculi and foreign bodies rest on the base. The urethral orifices and vessels are marked.

Although we may become rapidly proficient in placing

the light, it is far otherwise in the just appreciation of what is seen. A stone or needle encrusted with phosphates, or a typical growth, is as readily recognisable by a novice as are some well-marked conditions of the retina, tympanum, and larynx, when examined by means of the ophthalmoscope, otoscope, and laryngoscope.

There are, however, certain conditions of the mucous membrane which are at first exceedingly puzzling, and which require some experience to determine their nature. One of these pitfalls consists in swollen mucous membrane, another in rugæ of the mucous membrane of the insufficiently dilated bladder simulating outgrowths from the wall. I shall have to allude to these and other fallacies in the following pages. Lastly, it is at first very difficult to appreciate the exact size of the object we examine. The size of the object as seen through the instrument varies according to the distance of the prism from it. If the prism be near, the object is magnified, and we are deceived as to its proportions; if the prism be withdrawn, the opposite effect and error is induced.

It will be found that the cystoscope fails under three conditions :

1. It can rarely be passed without undue violence in patients the subjects of irregularly enlarged prostates or in hard unyielding carcinomatous prostates, for in both of these classes the prostatic canal is very dense and devious, and blood becomes smeared on the window and mixed with the urine in the bladder. An ordinary enlarged prostate offers but little impediment to the introduction of the instrument, but it is impossible to examine the pouch behind the prostate if that depression is deep. Nor can the base be thoroughly searched if the intra-vesical prostatic outgrowth be large.

2. Stricture of the urethra of course offers an impediment to the passage of the cystoscope. This obstruction can easily be removed by dilatation. It may happen, moreover, that in dilating the stricture to facilitate the introduction of the instrument we may remove the cause

of the obscure symptoms which have suggested the electric-light exploration of the bladder. If the meatus be small it can easily be cut inferiorly, under cocaine, to the proper size by a touch of a blunt-pointed bistoury.

3. If the urine contain blood or pus the wall cannot be distinctly made out, for the light seems to be placed in a red or white fog, and everything is obscure; this is, however, generally obviated by washing out the bladder and replacing the murky medium with clear water.

4. It will be found that the cystoscope is difficult to work in contracted bladders, or in those in which the capacity has been greatly diminished by pressure from without.*

5. Occasionally spasmodic contraction of the bladder (especially in cases of tuberculous or other ulceration) will not allow a sufficient amount of water to be tolerated. Cocaine or anæsthesia usually overcomes this difficulty.

6. Certain deformities, such as an ankylosed hip, a rickety pelvis, or a kyphotic spine, will give the observer some difficulty in approaching the ocular end with his eye; a little management of the head is needed in these cases to obtain a good view.

Summing these points up briefly, we may say that there are three conditions indispensable for the employment of the ordinary-sized cystoscope.

1. The urethral canal must have a calibre of 22 French catheter gauge.

2. The bladder must have a capacity of at least four ounces.

3. The water in the bladder must be translucent and ought to be perfectly transparent.

Rules and Directions for the Use of the Cystoscope.

Before commencing to arrange the patient, it will save a good deal of annoyance if the lamp and battery are

* Compare author's cases of sacculated stone.

examined and proved to be in good working order. Connect the battery wires with the cystoscope, keeping the rheostat at the point of greatest resistance, and use the "switch" or key attached to the ocular end of the instrument to close the circuit. The incandescent lamp will now burn a dull red. Gradually move the rheostat until the filament emits a bright, white light. The instrument is now ready, open the circuit, and turn your attention to the patient.

This initial examination of the lamp is necessary, because after some time the carbon filament gets burnt and offers less and less resistance to the current, throwing out less and less light. By moving the rheostat to the proper point of resistance of the lamp we are able to depend upon the brightness of the light. The lamp may possibly require changing. It may have burnt through, and it is certainly annoying, if, after we have introduced the cystoscope and switched on the current to see no light at all. Nothing is easier in the Leiter instrument (page 26) than to replace it with another. But here a caution is necessary. No two lamps have exactly the same resistance, so that one lamp may burn brightly with the rheostat at maximum, its carbon filament offering but little resistance to the current; and another will only emit the necessary white light when the rheostat approaches zero, or the minimum. Hence every lamp ought to be first gauged by the rheostat in the manner just described. If this is not done, the operator will either fuse a number of lamps, or will only obtain a useless, dull, red light.

Presuming that no obstruction to the introduction of the instrument has been previously found in the urethra, such as mental contraction, stricture, or deviation of the prostatic canal, the patient is to be interrogated as to the amount of urine in the bladder. There is no transparent medium so perfect or so suitable as clear, healthy urine, and I always make a point of getting the patient to retain his urine if it be free from blood

and pus, as it not infrequently is in intermittent hæmaturia, so as to allow of at least five or six ounces being found in the bladder.

The cystoscopist can very often obtain this clear urine medium by giving the patient half a bottle of Contrexéville or Vittel water before breakfast for three or four days. Five or six ounces of medium is quite sufficient, but practically speaking, the more distended the bladder is, so much the easier is the examination of the base. It is worth remembering that the apex will be out of sight if the bladder contains ten ounces or more.*

Should the patient have passed his urine lately, or should there be pus or blood in his urine, it is of course necessary to replace that medium with clear water. A soft Jacques catheter is passed, and the bladder is well washed out with a warm saturated solution of boracic acid or a boroglyceride solution (3j to Oss). After the washings become quite clear,† four or five ounces of the same solution or of sterile saline solution are run into the bladder. A drachm or more of a 20 per cent. solution of cocaine may be injected through the same instrument, if this is required. The cocaine rapidly diffuses itself throughout the water, and serves not only to deaden the sensibility of the vesical mucous membrane in spasmodic cases, but also to allow of a still larger introduction of the boracic solution, if a difficulty in tolerating the necessary

* It will be found that the varying positions of the individual parts of the bladder produced by different degrees of distension are at first a source of fallacy to the operator. This difficulty may easily be appreciated by introducing the cystoscope in the dead subject and searching for the ureteral orifices when the bladder contains ten ounces of water. Now draw off five ounces and repeat the search; it will be found that the positions of the ureters have changed. They may project as conical masses, or they may even be entirely concealed by the folds of the bladder.

† In some cases of nodular carcinoma no amount of washing will produce a clear medium, for the blood is as rapidly poured into the bladder as it is evacuated and replaced by water. It is best in these cases to postpone the examination until the urine clears. In pyuria cases much more washing is needed than in ordinary hæmaturia.

quantity is experienced by the patient. An irritable bladder may thus be induced to accommodate as much as six ounces without discomfort. **It is always wise to stop at the point of discomfort**, for if more is forced in and ulceration is present, or a softish malignant growth has invaded the wall, the slightest overstretching causes a rush of blood which renders any attempt at cystoscopy futile. As the Jacques catheter is being withdrawn I sometimes squirt a little of a 20 per cent. solution of cocaine into the urethral canal, anæsthetising especially the prostatic section. No apprehension need be felt about the toxic effects of cocaine if no abrasion or laceration is present.* It is of course much more satisfactory in difficult cases to have the patient anæsthetised, for often in the middle of an examination of an irritable bladder without chloroform the patient is seized with an uncontrollable desire to pass water, and the medium has to be renewed if his wishes are acceded to.

In the greater number of my cases I have not used general anæsthesia. I employ it however (*a*) in young females for delicacy, (*b*) in tuberculosis or similar cases where the prostatic urethra is extremely sensitive, (*c*) when it is necessary to demonstrate some particular disease to a number of visitors, (*d*) or in order to make a leisurely prognosis, a discovered growth so as to determine the expediency of operating for its removal.

Usually the patient lies on his back with the trousers unbuttoned and thrown a little way down; a clean towel is placed across the trousers, upon which the right side of the observer's face can rest whilst he is looking down the cystoscope. Or, if it is preferred, the patient may lie on his back with his buttocks drawn to the edge of the table, with his legs bare and separated, the feet being

* I have used injections of the drug continually since its introduction in large out-patient practice and in private, and have never seen a case presenting symptoms of so-called cocaine poisoning.

supported upon chairs of suitable height. If an anæsthetic is used the lithotomy position is the best. The operator, being seated between the patient's thighs, now takes up the instrument, and either uses a drop or two of glycerine, or white of an unboiled egg to smear its surface with. This prevents murking the prism of the window. *It is of importance that the switch is not moved until the elbow is felt to have entered the bladder.* If this is not attended to the lamp may be set in action while it rests in the prostatic urethra, and that section of the canal is soon scorched by the heat of the hood.

On applying the eye to the ocular end of the instrument when the beak has been felt to have entered the vesical water and the switch has been so turned as to close the circuit, the observer will immediately perceive a yellowish-white glare at the end of the tube. With a little manipulation he will readily recognise the trabeculated surface of the bladder, and the minute vessels which ramify in the mucous membrane. If the medium be *quite transparent* and the mucous membrane healthy, the vesical wall will be seen illuminated by a bright white light, and the details of the wall will be as clear as if they were viewed by direct sunlight; but if the mucous membrane be swollen, or if the epithelial layer has been shed or stained with blood, the light appears feeble.* A beginner will indeed complain that the battery is not powerful, or that the lamp is exhausted; he may go so far as to withdraw the cystoscope and light the lamp to test its brilliancy. To his surprise the light may be dazzling and the problem puzzling, until he realises that the reflecting flat epithelial layer is destroyed, and that the light is absorbed and not reinforced by reflection as it is in health. To throw the light upon the base the cystoscope must be rotated (Fig.

* It must be remembered that the brilliancy of the light and the success of the examination *depend upon the operator.* 1st. The lenses must be clean. 2nd. The lamp must have sufficient battery power to produce a steady white light. 3rd. The medium must be quite transparent and sufficient in quantity.

45) ; the knob on the rim of the ocular end, corresponding as it does to the direction of the light and prism, is the guide for this little manœuvre.

The beak should always be kept "free" in the bladder, not thrust far back or pushed down on to the base. If

FIG. 45.



Cystoscope lighting up bladder base.

FIG. 46.



Cystoscope lighting up anterior wall.

either of these manœuvres is adopted the bladder will be plunged into darkness, for the beak with its contained lamp is enfolded by mucous membrane (Fig. 47). Putting aside this loss of light, there is the danger of scorching the surface.

After finishing the examination let the current be switched off, so as to prevent the lamp being withdrawn, in full action, through the urethra.

Figs. 45 and 46 show the light thrown upon the floor and anterior wall of the bladder. They represent fairly well the direction of the rays emitted from the end of the instrument.*

It will be noticed that only one cystoscope is used for all positions in the bladder, viz. that one in which the prism is situated at the concavity.

I have never yet had occasion to use the cystoscope with a posteriorly placed light and windows, nor do I consider such necessary for even a tyro.

Objections to the Use of the Cystoscope.

Two objections might reasonably be made to the use of the incandescent-lamp cystoscope.

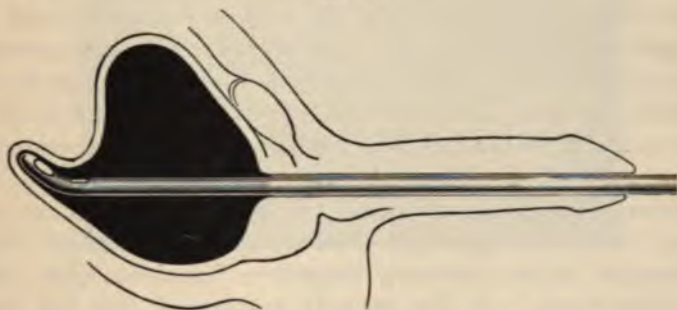
1. *Burning of the Mucous Membrane.*—Although the heat emitted by the cap or hood with its contained incandescent lamp, when in action, is not so great as that given off by the platinum wire lamp, yet it does become very quickly hot if it is allowed to burn *in air* instead of under water. Thus it becomes warm after four seconds, unbearable after ten, and scorches the skin severely after fifteen seconds. If, however, the tip of the instrument is placed in cold water, the heat is rapidly absorbed, and the cap or hood remains cool and may be touched with impunity even after a quarter of an hour's use. This is almost exactly what happens in the bladder, for the *warm* urine carries off the heat of the lamp as fast as it is formed. Hence the first, the cardinal rule in electric cystoscopy is, that the bladder has to contain five or six ounces at least of urine or water.

But there is a second rule: although the urine or

* In Figs. 45, 46, and 47 the black area is incorrect: it is introduced for the sake of contrast. The entire bladder is lighted up more or less.

water absorbs the heat of the cap if it be freely surrounded by the medium, yet this does not happen if the cap be held in contact with the vesical wall (Fig. 47). A just estimate of what would happen if the cap were kept in contact with the bladder wall may be very advantageously gained by the operator in carrying out the following simple experiment: Let him burn the lamp in a cupful of water and gently rest the tip of the finger on the hood. The finger will soon become unpleasantly, then

FIG. 47.



Lamp of cystoscope enveloped in posterior wall (Casper).

unbearably warm. The rest of the hood will, of course, be found to remain cool, for it is surrounded by water. When the operator, moreover, realises that the soft mucous membrane of the bladder is infinitely more sensitive than the hard cutis of the finger and less tolerant of injury, the necessity for avoiding any prolonged contact of the lamp with the bladder wall will be readily appreciated.

The second important rule in cystoscopy is, therefore, framed upon this danger of "beak" or "hood" contact. Never let the beak remain in contact with the bladder wall, keep it in the middle of the bladder.

This rule is especially important in catheterisation of the ureters, for the beak approaches nearer to the wall in this manœuvre than in any other.

I can illustrate this point forcibly. I have had for some years to demonstrate almost weekly to students or medical men the various changes one sees in the course of my cystoscopic cases. Sometimes as many as a dozen will successively look through the instrument, which is necessarily fixed in position so that all may examine the same object. As each observer leaves the ocular end I switch off the light for a few seconds, so that any chance of overheating the mucous membrane may be avoided.

One day I was cystoscoping the right ureter of a young woman of thirty-two years of age, who had been sent by Mr. Neville Howse for profuse hæmaturia and a slight enlargement of the right kidney. I was uncertain as to whether I had to deal with a renal tubercle or a renal sarcoma. No tubercle bacilli were found in the urine.* The bladder was healthy, and I demonstrated the absolute health of the right ureteral orifice† to a series of students, switching the light on and off, as is my custom, to prevent overheating. The patient was brought to the operating theatre a fortnight after for nephrectomy. As she casually mentioned that for the last few days she had had urethral pain and pricking after urination, I determined to examine with the cystoscope, on the chance that a prickly stone had descended into the bladder, and that my diagnosis of renal growth was incorrect.

On cystoscopy, I found on the posterior wall an elongated phosphatic-covered ulcer. It was upraised and red-edged, and measured about an eighth of an inch in its long diameter. I was now in a dilemma. Had I overlooked this ulcer at my previous cystoscopy? Was it a simple solitary ulcer? Was it the source of the hæmorrhage, and the slight renal enlargement an overmobile kidney? Was it a tuberculous ulceration, and the enlarged kidney another focus of the same disease?

* Tubercle bacilli are hardly, if ever, found if *much* blood or *much* pus is present in the urine.

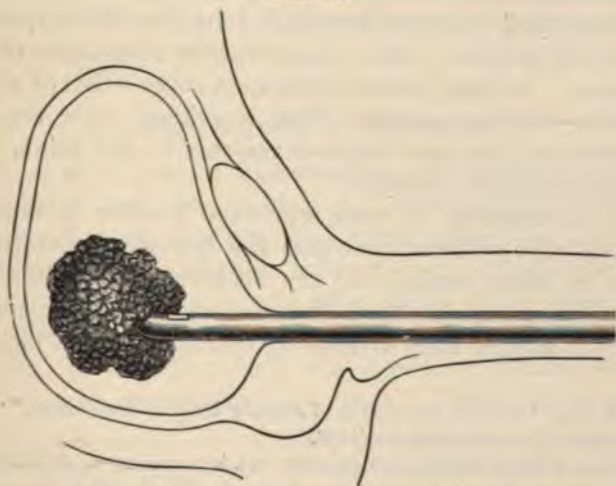
† This was against the diagnosis of tubercle of kidney.

FIG. 48.



Adenoma of kidney.

FIG. 49.



Lamp of cystoscope plunged into vesical growth.

I looked carefully again at the ulcer. I noted first it was in a wrong position for solitary ulcer;* then, that it was not circular but oval; lastly, that it was exactly where the beak of my cystoscope would rest when examining the right ureter from the side. I realised I was looking at a superficial erosion I had caused by allowing the beak to remain too long in contact with the wall, a condition which would be unpardonable if only *one* observer had examined the bladder. I immediately nephrectomised. The kidney (Fig. 48) was the seat of a small malignant adenoma, and the patient healed promptly, and there was no further symptom of the ulcer.

Occasionally the beak of the cystoscope is thrust into a papilloma and the light obscured (Fig. 49).

2. The second objection, that of inducing cystitis or cystopyelitis by the examination, is infinitely more serious.

It is commonly asserted by surgeons who use the cystoscope very occasionally, that they have never even caused cystitis by its use. Such statements need not be accepted as reliable. They are merely evidences of limited experience or clinical prejudice. Introduction of any medium, however aseptic,† into the bladder, other than the natural urine, causes visible congestion of its surface. In most instances the next stage—that of slight catarrh—is also reached. This is evident from the appearance of pus and micro-organisms in the urine, previously noted as “sterile.”

In the majority of cases when the bladder is able to evacuate its contents, or where the catheter is habitually used, no harm results, and the bladder recovers in a few days its normal health. This is obvious in litholapaxy, which is a much more distressing operation for the bladder

* Author, “Clinical Significance of Solitary Ulcer of the Bladder,” *Brit. Med. Journ.*, p. 1133, May 9th, 1896.

† I need hardly add that the greatest care is necessary in rendering all instruments and lotions aseptic and in thoroughly cleansing the genital orifices before commencing an examination.

than mere washing. But in a few cases an habitual state of bacteruria is induced, and turbid urine* is subsequently passed. Two vesical diseases in their advanced stages appear most prone to resent washing and manipulation; these are tuberculosis and soft carcinoma. If there be deposits of tubercle in the genital organs, or if the prostate or bladder base, as felt *per rectum*, be obviously infiltrated with new growth, it is useless to cystoscope; it is merely adding to the sufferings of the patient by inducing cystitis, and the knowledge gained is generally unimportant.

Personally speaking, I dislike washing out the old male bladder in obscure diseases of the urinary tract *merely for cystoscopic purposes*. I always endeavour, if possible, to render the urine clear by means of Contrexéville or Vittel water (*vide* p. 62). Even in men before the age of fifty I avoid washing as much as possible, for the more I cystoscope in the patient's own urine, and the less I wash out the bladder, the better are my results. Of course, if there is blood or pus the bladder must be thoroughly washed out before the cystoscope can be used. In this case I do not care to cystoscope unless I am allowed to start there and then upon any renal or vesical operation that is necessary.

The Mortality of Cystoscopy.

A most important question has now to be considered. A patient may have cystitis and cystopyelitis of a mild grade after washing out the bladder prior to cystoscopy, but is there real danger—has cystoscopy a death rate? I am bound to answer in the affirmative. The passage of the cystoscope if it be gentle, and its rotation in the bladder if it be purposive, is as free from risk as routine catheterism, or sounding for stone. There is, as every

* This urine can only be recognised by the smoky or shot-silk-like appearance it assumes when shaken in a bottle. The optical result is apparently due to the movement of rod-shaped and other bacteria, with a few pus-cells.

surgeon is aware, some risk in the first introduction of any instrument through the deep urethra,—a risk which must not be made light of.

The cystoscope must be regarded in the same light and with the same deference that the bougie, the sound, or the catheter is regarded, for, as Sir Henry Thompson has so tersely and so wisely expressed it, "The introduction of an instrument is, more or less, an evil, never to be resorted to unless a greater evil be present, which its employment may probably remedy." But anxiety need not be felt if the cystoscope is used in the patient's own urine. The danger, and in rare instances the fatality, occurs after washing out the bladder of the patient with residual urine and deteriorated kidneys. I have had one fatal case and I have seen several others. My own was published in 1889.*

Traumatic renal hæmaturia; cystoscopy; acute suppurative nephritis; death.—A gentleman, æt. 50, was sent to me in 1889 for cystoscopy in order to ascertain the cause of a severe intermittent hæmaturia of eight weeks' duration. The patient stated that one evening, after a heavy meal, he was stooping down, attempting to drag out a heavy lower drawer from his bureau, when he suddenly felt an intense desire to urinate, and he immediately passed a large quantity of bright fluid blood. He was not quite certain as to whether he felt something give way in his left side or not. The hæmorrhage ceased and recurred, finally becoming intermittent. The blood was always intimately mixed. The bladder was thoroughly washed out and examined with the cystoscope. It appears quite healthy. The mucous membrane was smooth. On the right side of the base was a small blood-clot adherent to the surface. The probability was that the case was renal, but as no blood was flowing, it was uncertain which side was affected. The patient had a rigor the same evening and fever; he began to suffer great pain to the right of the navel and in the left renal region. The blood ceased, the temperature fluctuated, he became uræmic, and died, evidently of suppurative nephritis, within three weeks. No autopsy was allowed.

I was not able to state accurately the lethal part played by the examination in this fatal case, for no autopsy

* Author, 'Electrical Illumination of the Bladder,' 2nd edition, p. 208.

was allowed. It appeared to me that the suppurative nephritis followed as a direct consequence upon the cystoscopy. I can safely say that it was not the result of any operative lesion, for the instrument was swallowed easily by the urethra, the visual examination was finished in less than a minute, and no pain was caused. The first signal of alarm was the rigor twelve hours after. From what I saw of the patient subsequently, I believe that the damaged kidney had suppurated under the influence of septic cystitis.

Brief Rules for Simple Cystoscopy.

In starting an examination let the operator commence with the form of instrument shown in Fig. 45. Let it, and everything else used in the examination, be aseptic. The following golden rules are worth remembering:

1. See that the bladder contains at least six ounces of clear fluid.
2. Regulate the lamp beforehand.
3. *Do not switch on the current until the elbow is well within the bladder.*
4. *Do not keep the cap in contact with the wall; keep it free (vide Figs. 47, 49).*
5. Let the manipulation be gentle and purposive.
6. Let the instrument remain half a minute in the bladder after the current has been shut off, in order to *completely cool the hood before you withdraw.*
7. Let the base of the bladder be examined first; for the inferior zone of the bladder is to vesical endoscopy what the optic disc is to ophthalmoscopy,—the most important area in the examination.

It is to the inferior zone that the cystoscope is first directed, for it is this section of the bladder which contains or conceals, for the most part, those diseases which rank as "obscure." Thus calculi—free, latent, or sacculated; foreign bodies (other than stones); growths—malignant or benign; ulcerations; and even pouches are

all more common in the inferior zone than in the middle or superior.

The principal points in the inferior zone are the ureteral orifices.* I never feel quite safe in a cystoscopic examination unless I have clearly seen these openings and their immediate neighbourhood.

* *Short note concerning the location of single tumours found in the museums of Great Britain.*

Villous papilloma (author, 'Path. Trans.,' 1888).

Conclusions—1. Growths that are single are generally found in the inferior zone (86 per cent.).

2. They spring from the *margins* of the trigone.

3. They are found at the right ureteral orifice in 43 per cent., at the left ureteral orifice in 26 per cent., and on the interureteral bar in 10 per cent. of the cases.

4. They are generally pedunculated or tend to become pedunculated in the proportion of 2 : 1 (43 per cent. are pedunculated, 20 per cent. are sessile, 33 per cent. are sessile).

Fibromata.—90 per cent. are at the ureteral orifices.

Sarcoma (author, *ibid.*).—Sarcoma of the adult. The trigone is rarely the site of the disease. The favourite spot is the posterior wall, either just behind the right or the left ureteral orifice. They are usually sessile (10 per cent. possessed pedicles).

Carcinoma (author, *ibid.*).—The right and left ureteral orifices are rarely the origin of carcinoma, though of course they may, and generally do, become implicated by extension. The posterior wall in the middle zone is the part most often affected, *i. e.* 63 per cent.; next to this comes the trigone itself, 20 per cent.

As regards the liability of the three zones to become affected by SINGLE cancerous growths, the following statistics are of importance to the cystoscopist. They are estimated by the author from 100 cases of carcinoma vesicæ:

Upper zone	7.2 per cent.
Upper and middle zone	7.2 „
Middle zone.	22.5 „
Middle and lower zone	17.5 „
Lower zone	42.5 „

The upper : middle : lower zone :: 1 : 3 : 6 as regards liability to carcinoma.

CHAPTER IV.

KELLY'S METHOD OF EXAMINING THE FEMALE URINARY ORGANS.

Catheterisation of the Female Ureters.

It is immaterial whether we examine the female bladder or catheterise the female ureter by means of the male instruments or by means of Kelly's method. The latter is, however, so valuable and so simple that I give it here in detail, quoting especially from Kelly's work.* I cordially agree with the statements he makes. The essential features of Kelly's method are :

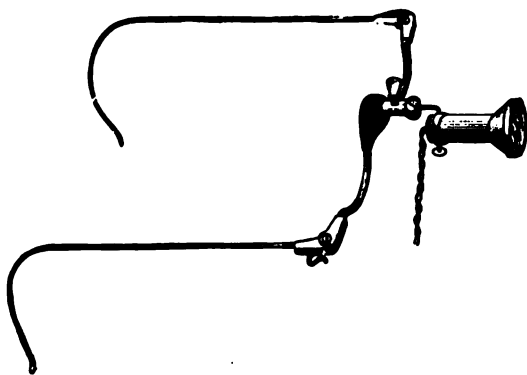
1. An atmospheric dilatation of the bladder induced by posture.
2. The introduction of simple straight specula without fenestræ.
3. The examination of the mucous surfaces of the bladder and urethra.

The following instruments are required : a good light from a head mirror or an electric head lamp ; an urethral dilator (Fig. 51, B) ; a speculum A with an obturator ; a suction apparatus to empty the bladder completely ; a pair of long mouse-tooth forceps ; a searcher for discovering the urethral orifice (Fig. 51, D), and an ureteral catheter (Fig. 51, C).

Method of Examination.—"Immediately before examination the patient must pass water, preferably in the stand-

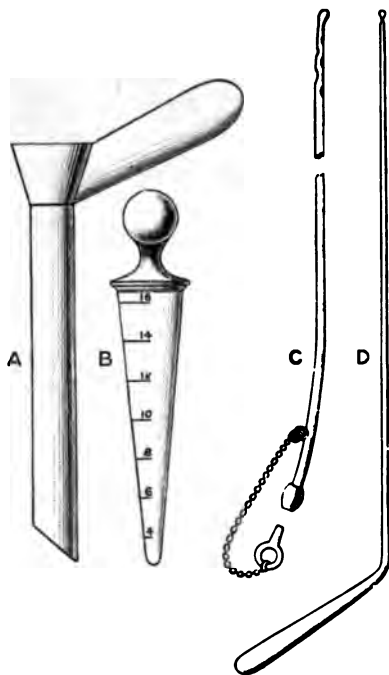
* 'Johns Hopkins Bulletin,' November, 1893; 'American Journal of Obstetrics,' January, 1894.

FIG. 50.



Spectacle with a Washington-Isaac lamp for female cystoscopy.

FIG. 51.



Kelly's instruments for female cystoscopy.

ing position. In spite of this effort to empty the bladder completely a little residual urine almost always remains behind. The patient is now placed in the dorsal (Trendelenberg) position, or in the knee-breast position. If in the dorsal, her hips are elevated six to twelve inches above the level of the table (Fig. 52). The urethra is anæsthetised by painting the external orifice with a 10 or 20 per cent. solution of cocaine, or by injecting half a drachm of the same along the urethral canal.

"The urethral orifice is now dilated by using a conical dilator (Fig. 51, B) blunt at the point, 72 mm. long, and 16 mm. in diameter at the base and 4 mm. at the point. This is covered with vaseline and, with a screw-like movement, gently bored into the urethral orifice. Two or three gentle movements, holding the dilator poised between thumb and forefinger, will be sufficient to carry it in as far as the number 10 mark on the scale on its side. This indicates a dilatation of 1 cm. in diameter, sufficient for all ordinary purposes of investigation of the bladder, treatment of its surfaces, and catheterisation of the ureters. In many cases, particularly in women who have borne children, the orifice needs no dilatation to permit the introduction of a speculum of this size. The utmost damage done by this dilatation is a slight superficial injury to the mucous surface of the posterior margin of the urethra, which never requires attention.

"I wish to call especial attention to the fact," says Kelly, "that dilatation of the external orifice of the urethra by a conical dilator alone is sufficient for the investigation. The speculum (Fig. 51, A) is now passed, and if the patient be a thin woman and placed in elevated dorsal position (Fig. 52), directly the speculum enters the bladder air rushes in audibly and distends that viscus. But this simple process will not succeed with a fat woman. The most convenient and universally applicable position is the knee-breast posture, with the chest as close to the table as possible, and the back well bent in, the patient squatting a little backward, so that the buttocks are in a position

directly over the calves of the legs or the ankles, instead of being vertically over the thighs.

The examiner now directs the light along the speculum and if he see any residual urine he sucks it out, cleans,

FIG. 52.



Cystoscopic examination of black woman, with elevated pelvis, dorsal position. Introducing the searcher into the left ureteral orifice. (After Kelly.)

ing if necessary with the long mouse-toothed forceps armed with a pledget of cotton wool.

Dr. Kelly describes the appearances as follows :

“ The first part is seen about the middle of the posterior wall. The groundwork of the bladder appears of a dull whitish colour, everywhere divided up by a network of branching vessels. The thinner vessels, almost like capillaries, can be traced to their trunks, and these again to larger trunks, one or two millimetres in diameter, of a

dark or light red colour which seems to come up to the mucous surface from the deeper layers where the vessels lie hidden from view. Occasionally an artery can be distinctly seen to pulsate. Sometimes little glistening points appear along the vessels. By elevating and depressing the handle of the speculum and moving it from side to side all parts of the posterior hemisphere are brought successively into view. The size of the area viewed at any one time depends upon the calibre of the speculum, its closeness to the bladder wall, and the distance of the examining eye from the external opening. By markedly elevating the speculum the vault of the bladder is seen with the same distinctness. As a rule the residual urine, to the amount of $1\frac{1}{2}$ to 2 drachms, will have to be removed by the suction apparatus before all parts are brought into view. If the handle of the speculum is dropped a little, the floor of the bladder is brought into view. This is more or less in the plane of the eye of the observer, and must be examined with greater care to detect all the peculiarities of its surface. In order to bring special parts of the base more clearly into view, the speculum can be pushed until its edge rests upon the part, and then by dropping it a few millimetres and advancing it just a little, the area in question will be made to lie directly over the speculum, at right angles to its former position.

The *trigonum* is brought into view by withdrawing the speculum until the internal urethral orifice just begins to close over it, and then pushing it in a little and dropping the handle slightly. This portion of the bladder is, as a rule, a little more injected and rosy than the rest of the mucosa. The interureteric ligament is sometimes marked as a distinct rounded transverse fold. By turning the speculum to the right or left about thirty degrees, with its end projecting 1 cm. into the bladder, the right and left ureteral orifices can be brought successively into view. The ureteral orifice usually appears as a little slit about 3 mm. long, placed transversely, with a slight horse-shoe-shaped elevation around it, open on the inner side.

Usually, with the woman in the knee-breast position, the ureteral orifice is found on the inner side of a decided eminence, having the form of a truncated cone (*mons ureteris*). The ureteral orifice may at times appear as a little pit or hole in the mucosa, at other times as a rosette with the opening in the centre. If the observation is continued for a minute a little jet of urine will be seen to spurt out of the ureter for two or three seconds. The ureter then closes, to be opened by another jet within the following minute. I have repeatedly seen pus or blood escaping from one ureter, while clear urine escaped from its fellow.

The ability to find the ureter readily is developed by practice. An experienced observer will introduce the speculum and turn it toward the side in question, and with one or two slight movements of adjustment, pushing it, withdrawing it, or turning it a little, will have the ureteral orifice within the field of vision within two or three seconds.

Occasionally the bladder presents some little depression which the examiner cannot be sure is not the ureteral orifice. The doubt may be readily settled by taking up the searcher, which has a strongly curved handle, keeping it out of the field of vision, and introducing its point into the opening. If it is the ureter, the searcher will pass readily, 3, 4, or even 6 or 8 cm. (1, 1½, 2 or 3 in.). I have not noticed any special sensitiveness about the ureteral orifice.

In the virgin it may be difficult to find the ureteral orifices, owing to the fact that the bladder balloons out too much, carrying the base high up towards the sacrum. To gain even an unsatisfactory view under these circumstances, the observer has to get his head almost under the patient's body. This difficulty will be overcome by taking the precaution beforehand to introduce a speculum into the vagina, in order to distend it with air. This prevents the excessive distension of the bladder in this direction.

That portion of the bladder which lies behind the symphysis may be inspected by elevating the handle of the speculum very decidedly and looking down toward the anterior part of the vault."

Sounding and Catheterising the Female Ureters.

"The passage of a catheter, sound, or bougie into the ureter is as easily accomplished as the inspection of its orifice, and, if gently conducted, is a simple, painless, and harmless procedure. I have found it necessary under a variety of conditions, the most important of which may be classified under the following headings:

First, for the collection of urine directly from the ureter, without contamination with the bladder, in order to determine the presence or absence of renal disease, or of one kidney and not of the other.

Second, to determine the existence of ureteral disease, such as hydro-ureter and pyo-ureter.

Third, in order to lay a solid bougie in the ureter, so that it can be kept constantly under touch and recognised throughout any abdominal or pelvic operation in which it was in danger of being cut or tied.

For a ureteral catheter I use a simple metal tube about 25 cm. (10 in.) long (Fig. 51, c), gently curved at its outer end, which is held in the hand, so as not to obstruct the view during its introduction. The end is also enlarged a little, so as to hold a fine rubber tube slipped over it in washing out the ureter and kidney. The ureteral end of the catheter has a rounded point with three or four holes in it, and a very slight curve at the end.

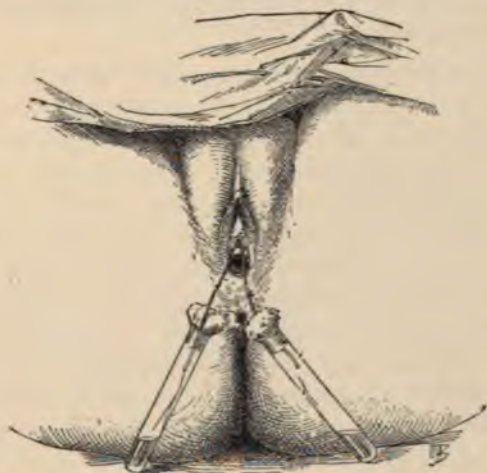
To introduce the catheter, the ureteral orifice is brought to about the centre of the field of the speculum, and the mirror and light are adjusted so that the head of the observer is not in the way as he introduces the catheter into the speculum and slides it on until its point rests in the ureteral slit. On pushing it in a little, the sides of the opening separate, and it appears as a

hole, with the catheter lying in one side of it. The catheter must now be pushed out gently toward the side, stopping at once if the slightest resistance or obstruction is met. When it has reached the pelvic wall, 4 or 5 cm. (1½ to 2 in.) from the orifice, it must be firmly held while the speculum is slowly drawn out, disengaged from the urethra, and pulled over its end. It is usually necessary for an assistant to pull open the buttock of the side on which the handle lies, to keep it from making such undue pressure upon the ureteral catheter as may injure the ureter. The patient who has been in the knee-breast position may now raise herself up on her elbows or hands, while the urine is collected as it flows from the catheter. A minute or two, or more, often elapses before the flow begins. It is easy to tell whether the catheter is filling by stopping up its end with a little drop of water, which blows out in the form of a little bubble as soon as there is any movement within. The urine escapes intermittently by three, four, or five drops, one after the other, followed by a pause of from a few minutes to a half-minute or more. The average amount of the flow should be a half cubic centimetre (½ drachm) per minute. It is often less than this, but rarely more, unless there is some disease. I have, in a number of instances, seen the urine escape from the catheter in a steady stream, but they were all cases of hydro-ureter.

For a prolonged drainage of the ureter, or in order to drain both ureters, permitting no urine whatever to enter the bladder, it is necessary to introduce two short ureteral catheters, with fine rubber tubing on the ends, in the following manner: The catheters are about 6 cm. long (2½ in.) and 2 mm. ($\frac{1}{16}$ in.) in diameter, slightly curved, and with holes in the end, like the ureteral catheter just described. The outer end of the catheter is a little enlarged, and over it is passed a piece of fine rubber tubing about 15 cm. (6 in.) long. A stylet with a strongly bent handle is coated with vaseline and introduced into the catheter through the tube. This gives

the requisite stiffness and length for the introduction of the catheter into the ureter after the manner previously described. The catheter is pushed well on, until its outer end lies within the bladder 1 or 2 cm. ($\frac{1}{2}$ to 1 in.) from the ureteral orifice. The stylet is now withdrawn, and after it the speculum, very slowly, taking care not to drag the rubber tubing with it. The speculum is again dipped in sterilised vaseline, and re-entered into the bladder, beside the rubber tube. The opposite ureter is now exposed and catheterised in like manner and the speculum again withdrawn. The rubber tubes now lie

FIG. 53.



Catheterising the ureter. The case illustrated was one of hydro-ureter in which there was a stricture of the left ureter. The ureteral catheter passed the stricture and 100 c.c. of urine were drawn off in less time than 3 c.c. would be collected under normal conditions. (Kelly.)

in the vulvar cleft emerging from the urethra, conveying the urine from right and left kidney into separate vessels. Care must be taken to mark the tubes, distinguishing right from left (Fig. 53).

I have also been able to catheterise both ureters in this way without withdrawing the speculum, by catheter-

ising one first and pushing several centimetres of its rubber tube into the bladder so that it would not be pulled upon, while turning the speculum to the opposite side to catheterise the other ureter.

I have had flexible bougies made $2\frac{1}{2}$ mm. ($\frac{1}{16}$ in.) in diameter and 40 mm. ($1\frac{1}{2}$ in.) in length with well-rounded ends. These are kept cool, so as to be stiff when wanted for use. If too flexible they cannot be introduced into the ureter. The bougie is inserted into the ureter by passing it along the tube, which is elevated until the end of the bougie lies in the ureteral orifice. The bougie is then slowly pushed on two or three cm. (1 to $1\frac{1}{2}$ in.) at a time, grasping it close to the speculum. There is no difficulty in this manner in carrying it all the way up to the kidney."

CHAPTER V.

METHODS OF OBTAINING RECORDS OF THE APPEARANCES OF VESICAL DISEASE.

Sketches—Clay or Wax Modelling of the Living Bladder— Photography.

THE changes in the aspect of the mucous membrane of the bladder produced by relaxation, congestion, or infiltration are so varied and often so remarkable, that it is only by systematically accumulating a record of these appearances that a sure basis for establishing a sound diagnosis, prognosis, and treatment of vesical disease upon visual grounds can be acquired.

Drawings in pencil, pen, or colour are most valuable if carefully taken, but they are never *true* representations, nor do they convey to others an exact idea of the disease they attempt to depict. The reasons for this are obvious. The cystoscopic field from which the artist draws is small, and the area to be portrayed is often large; hence a number of drawings is generally necessary to represent the disease in its entirety. Again, the cystoscopic field changes with the slightest movement of the patient or the operator. Even a cough, a deep inspiration, or a slight involuntary vesical contraction, or the rolling of a faecal-laden coil of gut behind the bladder, is sufficient to puzzle a non-professional artist, by suddenly displacing or distorting some salient feature which he may have taken as a "fixed point." Moreover, if bleeding should occur before the painting or drawing is completed, the

transparent medium has to be renewed, and it is often difficult to re-distend the bladder so exactly as before as to obtain the same view of the object. Lastly, it is most difficult to imitate in colour the various and varying hues of a cystoscopic picture. The merest glance at any coloured representation of any vesical disease will serve to accentuate the truth of this remark. How then can we obtain and retain a record of our visual experiences of the protean aspects of vesical disease?

At first I found myself much hampered by not being able to graphically record the many new and interesting clinical facts which the electric cystoscope was constantly revealing to me. After many expedients I fell back upon a substitute which I employed for some time, and with considerable advantage. I refer to modelling in some plastic material the interior of the living bladder as it appears illuminated by electric light.* The plan I adopted of making clay or wax models of the diseased living bladder is similar to that which I recommended at the surgical congress† in Berlin in 1888, for recording the changes of shape in the living prostate.‡ It is easily carried out, and only needs a small bowl or its shape-equivalent, a little oil, a penknife, and a handful of sculptor's clay, or the new modelling material, Harbutt's Plasticine.§

As an example: suppose I wished to retain a record of an epithelioma of the bladder in an early stage. The clay was dropped into the bowl, and flattened out into a thick layer. A concave surface was thus formed, which roughly represented the interior of the bladder. A little oil previously smeared over the inside of the bowl permitted the model to be subsequently turned out after

* Author, 'Clay and Wax Modelling of the Living Urinary Bladder under Electric Light,' *Brit. Med. Journ.*, Jan. 5th, 1889.

† "Ueber Thonabdrücke der Prostata am Lebenden," *Langenbeck's Archiv*, Bd. xxxvi, Heft 2.

‡ *Brit. Med. Journ.*, May, 1887.

§ Harbutt's Plasticine may be obtained from any of the large educational supply houses.

PLATE I.

CLAY AND WAX MODEL OF A BLADDER AS SEEN BY ELECTRIC LIGHT.



Long-leaved villous papilloma overhanging left ureteric orifice.

drying. The patient's bladder was now carefully examined in all parts by electric light, and the diseased section localised. Each part of the tumour was next observed, its size and the character of its surface appreciated. The light was switched off, and the handle of the cystoscope given to the patient or the assistant to hold, or it was laid on a scrotal cushion. A fresh piece of clay, the size of the tumour, was taken and roughly modelled to the shape of the growth. The light was again turned on, and the tumour re-examined. With a little trimming by means of the knife and fingers, the clay shape was made to assume the form of the growth. It was finally stuck on to the concave clay in the bowl, its position being easily marked by pricking two slits to represent the orifices of the ureters.

Photo-print 1 (Plate I) is from a clay and wax model which was taken of the bladder of a patient suffering from villous papilloma of the bladder, a growth which is most difficult to represent in clay, although the villous processes can easily be modelled in appropriately coloured wax. The patient was brought to me by Dr. Harle, of Hackney, in 1888, with painless hæmaturia and a diagnosis of probable vesical growth. A very beautiful "primrose-leaf" villous-surfaced tumour was seen attached to the upper lip of the left ureteral orifice, its long individual leaves swaying apart at each jet of urine propelled from the subjacent opening. Some of the leaves were whitish from loss of blood-supply. Its pedicle appeared to be succulent and epitheliomatous. The patient was leaving for Australia two days later, but he was able to take with him a photograph which I trusted would afford the surgeon he next applied to a sufficient representation of the disease he was suffering from.

These sentences were written in 1888 for the second edition of this work. The patient to whom they referred was lost sight of. Eight years later, in 1896, he returned to London, and came under the care of Mr. Dudley Wright, to whom he showed the photograph. Mr.

Wright performed supra-pubic cystotomy, and removed the growth I had detected and depicted, and in addition a smaller one from the opposite ureteral area and several other still smaller splashes of growth from various parts of the bladder.*

The second photo-print (Plate II) represents a stunted villous papilloma over the left ureteral orifice. It was taken for Dr. Frank Oldfield, from a patient of his.

Mrs. B—, æt. 43. This lady had been under treatment by a homœopath for two years without any examination being made. Florid blood had been passed at the end of clear micturition. Much pain had been suffered; a fœtid urethral discharge was sometimes observed; usually the urine was coffee-coloured. Cystoscopy:—"Bladder wonderfully healthy, except at the opening of the left ureter; at this spot there is a monkey-nut sized growth of a pinkish gelatinous aspect. It slightly overlaps the orifice. This tumour is evidently of soft consistence, for its abutting and partly overhanging surface has become quite concave, hollowed out doubtless by the constant action of the outflowing stream of urine from the ureter. I watched several emergent jets strike and churn within this little alcove, and sweep on to toss and buffet the fragile villi with which the growth was sparsely covered. Ulceration has also been at work and left its mark, for deposits of phosphatic grit are plainly visible in the cracks and dimples on the surface."

Operation being permitted, I dilated the urethra, and found the growth to be polypoid and pedicled, and in the above-mentioned position. Having snared it, I cut through the stalk. The growth recurred several times—each time it was treated in the same way. The interval of health varied in duration; once, two years of rest and comfort were obtained by the procedure.

The mere attention which the manipulation involves calls forth the observation and the recognition of those minute differences upon which *prognosis and treatment* must depend, for it cannot be too strongly insisted upon that the electric cystoscope ought not only to be an efficient aid to diagnosis, but ought also to assume the higher position of a prognostic agent which may deter the surgeon from needless interference, or may indicate to

* Vesical papillomata often multiply (by seedlings) as time goes on.

PLATE II.

CLAY AND WAX MODEL OF A BLADDER AS SEEN BY ELECTRIC LIGHT.



Phosphate of lime encrusted villous papilloma overhanging left ureteric orifice.

him the form of operation best suited for the removal of the growth in question.

I do not attach any importance to this method of keeping records since photography of the living bladder has been rendered practicable and practical. It is tedious, crude, and at best inaccurate. I recommend it, however, very strongly to earnest beginners in this field as a valuable means of training the eye and fingers, especially the former.

The *ne plus ultra* of cystoscopic delineation is instantaneous photography with an instrument like the kodak, which takes by means of a shutter, a series of "snap shots" of the interior of the viscus by merely turning the cystoscope in various directions. It would seem easy enough, if the electric light can be introduced into a hollow viscus, to photograph the contents of that cavity, but certain mechanical obstacles in the living bladder cause this method to be somewhat uncertain. Many of the growths are actinic in colour, and the inflamed mucous membrane does not give a sufficient contrast to act as a good background. Not only do the individual fringes or surface components of the growth sway freely about in the tiny currents produced by the heat of the lamp or the respiratory movements of the patient, but every few seconds a rush of urine from the ureter churns up the floating particles which settle towards the base, and sweeps the *débris* right across the field of the prism.

Mr. Pearson-Cooper (of the London Camera Club) and I* were able, after much expenditure of time and trouble, to obtain good negatives of artificial growths

* Compare also Geza von Antal, 'Internationales Centralblatt für die Physiologie der Harn und Sexual Organe,' Bd. i, Heft 1, p. 18. Prof. Antal's photograph of the living bladder is a failure, both as regards size and detail. Although obtained with almost every advantage—a woman's bladder, a good light, a lens system of Terrestier's, a black hair-pin standing out in bold relief against the mucous membrane, his picture only shows *one* dark indistinct shadow obliquely crossing an area the size of a pearl shirt-button.

both in the dummy and the dead bladder, but we failed in the living bladder. Others applied themselves to the solution of the problem and with success.

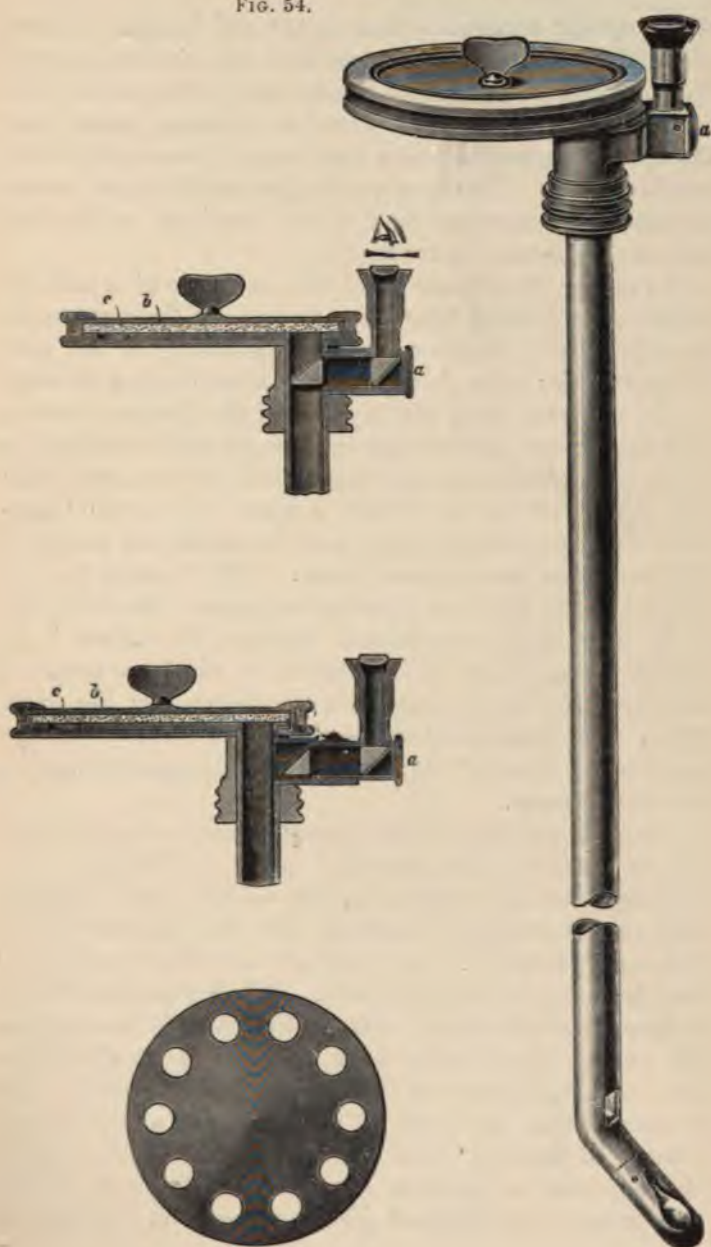
In 1879 Nitze suggested the practicability of photographic reproduction of cystoscopic pictures, and indicated in 1889 in his text-book of cystoscopy the method which he considered would yield the best results; but the lines he indicated proved impracticable. It was not till after the labours of Actin and Jaccoud had advanced the subject that Nitze resolutely took the subject in hand and completed a practical photocystoscope. This cystoscopic camera he applied to the large clinical field he enjoys in Berlin, and has embodied his result in a very elaborate and beautiful atlas of cystophotography, a work upon which inconceivable time and labour has been lavished.

Nitze named the new instrument a photographic cystoscope, the construction of which is shown in the following figures (Fig. 54).*

A camera of the shape of a flat round box is fixed to the external end of a cystoscope of somewhat larger diameter and supplied with a stronger lamp and better lenses than usual, but otherwise of ordinary construction. The right-hand figure represents the exterior, and the two upper cuts on the left side exhibit the internal construction of the instrument. It will be observed that the cystoscope is fixed at the edge and not in the centre of the camera. To the floor of the camera, which is provided with an opening corresponding to the eye-piece of the optical apparatus, a rotating disc is attached which is perforated by a number of circular openings of exactly the same size as the eye-piece, so that on rotating the disc the openings pass in succession over the eye-piece. A glass plate is put on the rotating disc with the sensitive layer downwards, which by the peculiar construction

* This description is taken from Nitze's atlas translated by Dr. Michell.

FIG. 54.



of the optical apparatus receives the real image. If now the camera is closed and rotated on its axis the disc and the sensitive plate follow the rotation; the arrest of a spring marks the moment when an opening passes over the optical apparatus and a new image is received on the sensitive plate. The number of negatives obtained is consequently the same as that of the openings in the disc (ten in the present instrument).

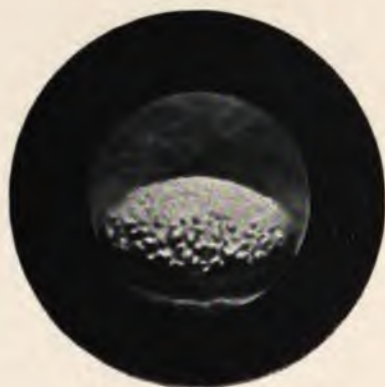
An ocular piece made up of two prisms and a lens in combination is fixed laterally to the tube of the cystoscope, its object being to allow the exact focussing of the part of the bladder to be photographed; when looking through it the observer sees the interior of the bladder just as well as through an ordinary cystoscope and is enabled to focus the object correctly; during that time no rays from the object fall on the sensitive plate. A simple movement now exposes the plate, and the small real image is impressed on the exposed plate. The camera is now rotated until the next opening is opposite the tube, and it is then again ascertained whether the object is in proper focus. Thus it is possible to obtain a series of exposures, either of one or more objects, on the same plate. The dimensions of the real image in the cystoscope are 3 mm.; those of the unenlarged photographs are of course the same.

The manipulation of the instrument is a comparatively simple matter; the sensitive plate is brought into position, the lid screwed on, the ocular piece adjusted, and the instrument is passed into the bladder like an ordinary cystoscope. Any part of the wall of the bladder may be easily brought in focus. When the selected spot is found the instrument is fixed, the current interrupted, the ocular piece drawn back, and the lamp allowed to burn as brightly as possible for three to ten seconds. The current is then again cut off and the cover of the camera rotated to the right until the arrest of the spring marks the exposure of another part of the plate; if several exposures of the focussed part are required, the lamp is

PLATE III.

CYSTO-PHOTOGRAPHS OF THE LIVING BLADDER, BY NITZE.

A.



Cysto-photograph of a flat, oval, uric acid stone.

B.



Cysto-photograph of a walnut-sized tumour.

again made as strongly incandescent as possible for a short time ; otherwise if it is required to photograph another part, after cutting off the current and readjustment of the ocular the next selected part is brought into focus and photographed as before. In this way ten negatives may be obtained either of one or of different parts of the bladder ; the time of exposure may also be varied at pleasure. As it is well known that even in ordinary photographic work a certain percentage of the negatives obtained are indifferent or useless, it is not surprising that under the increased difficulties attending cystoscopic photography only a part of the negatives give satisfaction. It is, therefore, the more important to be enabled to take a number of negatives of the same object in a short time, as the probabilities are thus increased of being able to select some free from defects.

I cordially agree with Nitze in thinking that the photographs satisfy all reasonable requirements ; they represent most distinctly the delicate vessels, tiny miliary tubercles, stones, tumours, etc., and also the details of the healthy bladder, the mouth of the ureter, the air bubble entered with the catheter ; calculi within the bladder appear as solid as if photographed when lying on a table. Good exposures at the same time reproduce the peculiar sheen and brightness which is characteristic of cystoscopic pictures. It may be fairly said that with the means now at disposal more cannot be attained ; further progress in cystophotography can only be anticipated when the problem of photographic reproduction of colours has been solved and the results applied to this special case.

The illustrations* which I am permitted by the courtesy of Dr. Nitze to introduce are—

Plate III, A, gives a good idea of the granular surface of a flatish oval uric acid stone lying on the base of the bladder.

* They show best when held in a strong light a couple of feet off the observer, the eye looking through a paper funnel or the hand.

Plate III, B, gives a view of a tumour from the bladder of a patient of seventy years. The tumour is of the size of a walnut; its surface is covered with villi.

Plate IV, c, shows a congenital diverticulum of the bladder,—the mucous membrane is seen passing into the diverticulum, forming a well-defined edge. Contrary, says Nitze, to what is seen in the case of acquired diverticula, the walls of the bladder do not show any trabecular structure.

Plate IV, D, hairpin from the bladder of a girl aged twenty. The hairpin appears much contorted owing to its oblique position relative to the prism; the two forks, which in reality were almost parallel, seem to diverge; the fork nearer to the prism appears much shorter; the shadow thrown by the other fork is very clearly seen. Between the two forks the ridge of the ureter with its somewhat prominent and pointed mouth may be noticed.

PLATE IV.

CYSTO-PHOTOGRAPHS OF THE LIVING BLADDER, BY NITZE.

C.



Cysto-photograph of a congenital diverticulum of the bladder.

D.



Cysto-photograph of a hair-pin in a girl's bladder.

PART II.

CLINICAL.



CHAPTER VI.

CLINICAL SECTION.

The Normal Bladder as seen by the Electric Cystoscope.

BEFORE entering upon the description of the appearances of the pathological conditions of the urinary bladder, it will be as well to give a short sketch of the aspect of the mucous membrane of the healthy viscus of the male.* It will be found that the slight differences which do exist in the arrangement of the vessel-branches and muscle-bundles in the normal bladder are immaterial and that any healthy adult will afford a good example of a normal bladder. The female bladder is, of course, the easier and safer viscus to examine.

The mucous membrane of the healthy living DISTENDED bladder appears, under the electric light, of a reddish-yellow or light straw colour. Its surface, although covered with water, is bright and glistening. Coursing here and there are a few sparsely scattered arborescent vessels, which issue at unfixed points, and run their course, dividing and subdividing apparently without anastomosis with other trunklets. These vessels are of varied tints. Some are thicker, and are evidently venous branchlets; others possess a more arterial hue. The retinal appearance of the healthy mucous membrane will be at once remarked. The questions have often arisen in my mind why large areas should appear to be so apparently destitute of vessels? and what has called the isolated systems that are seen into a visual existence?

* For a special description of the female bladder see p. 78.

On elevating the handle of the cystoscope slightly and rotating the ocular end a quarter revolution* first to one side and then to the other, we bring the entire posterior wall into view, and perceive projecting, in ill-defined longitudinal and transverse bundles, the fasciculi of the vesical muscles (Plate V, c). Here and there the bundles interlace, and form an intricate trellis-work-like mesh of greater or lesser delicacy. Between the lattice-bands are slight depressions, pits, or dimples—the precursors of the herniæ of disease (Plate V, d). The cystoscope disposes of the belief that this trabeculated condition is only observable in the pathological bladder. The elements are nearly always present, and need but the exaggeration of increased functional activity to produce the columniform bladder with its accompanying diverticula. One feature which will prove of interest to the tyro is the movement of the expanse of the posterior wall in thin people. A wave crosses like the motion of a snake beneath a blanket; this is merely the peristalsis of a heavy-laden coil of gut in the recto-vesical pouch.

If the bladder has been washed out for the inspection, a small, glistening, glass-like globe, reflecting the incandescent lamp upon its convex surface, will probably be seen attached to the mucous membrane. It oscillates at every pulsation of the adjoining iliacs, at every movement of the instrument, or at every jerk given to the patient's pelvis. It is an air-bubble introduced with the catheter or injection, puzzling the uninitiated as to its cause and character, but bearing with it a fruitful lesson for care in the prophylaxis of urinary or so-called catheter fever.

By depressing the handle of the cystoscope, and rotating it completely on its long axis, the window and the lamp can be made to overlook and lighten up the base (Fig. 45). In a healthy bladder the trigone is smooth and of a dull red, and is very sharply marked off

* The knob on the rim of the ocular end is the guide to the position and the amount of rotation.

by its colour from the yellow sand-like shore of the adjoining postero-superior and lateral walls. The trigone with its well-defined area, its slight elevation, and its characteristic colour, forms the great landmark of the cystoscopist. Its base line is an upraised bar which can be fixed upon at once and followed right or left until at either extremity the ureteric orifice comes into view. If the bladder is healthy and full of clear urine or medium, there will be no difficulty in discovering their tiny slit-like openings. Sometimes the lips are rather thick and pouting—a condition which, if not exaggerated, is compatible with perfect health. In a half-distended bladder the ureteric orifice is seen upon the top of a little mound or cone, the *mons ureteris* (Plate V, A). If one of these orifices be watched carefully the curious phenomenon of efflux will be seen.* The orifice and the area immediately around it gathers itself up, swells, and becomes a little pointed. The little slit then suddenly gapes and a tiny swirl of fluid is emitted. Sometimes the observer will notice all these movements without any efflux of fluid. These “dry” spasms may have a clinical significance, but I have not as yet ascertained it. Should blood be present in the ureter the effect is heightened, and the appearance of the jet of bloody urine issuing from the mouth of the canal reminds one of a miniature cuttle-fish squirting out its inky fluid into the surrounding water † (*vide* Plate V, B).

The appearance of an efflux of pus varies in accordance with its consistency. Semi-solid pus forms a most

* Ureteral contraction passes from above downwards (from the renal pelvis to the bladder) at the rate of 20–30 mm. a second, the adjoining bladder wall participating in the wave. The evacuation takes place every three quarters of a minute (Mulder). Dr. A. J. Zamskin (*‘Eyedelnaiia klinicheskaia Gazeta,’* No. 1, 1887, p. 13) has worked at the subject of ureteral efflux in a Finnish woman, aged forty-two, who had an extensive recto-vesico-vaginal fistula. Both orifices were exposed. Nine observations were made, each lasting an hour. It was found that the contractions of the orifices were rarely synchronous, and that they did not contract equally as regards number.

† Author, “The Value of Inspecting the Orifices of the Ureters by Electric Light,” *‘Brit. Med. Journ.,’* June 16th, 1888.

remarkable object. It issues like a pipe of macaroni paste being forced through its mould.

The orifices are sometimes indiscoverable, and no amount of skilful rotation or manipulation of the instrument will bring them into view (compare Chapter on Ureter).

Let the operator remove his cystoscope and inject a little more water. This manœuvre not infrequently produces the desired effect, for in an insufficiently dilated bladder the mucons membrane forms folds which overlap and conceal the orifices most effectually. Sometimes the ureter is displaced by disease;* only rarely is it absent.†

The urethral orifice can be thoroughly searched by withdrawing the cystoscope until the window is at the opening of the bladder. If the bladder is full, it is seen as a crescentic fold, dull-red in colour from the transmission of the rays of light through its vascular substance. It is not usually a sharp-edged fold, being more generally rounded. By rotating the instrument every part of the circle can be examined. In the half-distended bladder, especially if the neck be inflamed, the orifice is marked by folds which are often puzzling until the cystoscopist examines them in full face. Their character is then apparent (Plate VI, A).

But supposing the cystoscope is used in a bladder with hardly any water in it, the entire shape and aspect is changed. The superior or intestinal wall is then seen to be sloping like the roof of a house. It is covered by very dull reddish-brown, wrinkled mucous membrane: the fine striæ of the longitudinally placed creases causing the appearance of shot silk to be assumed. The trigone is puffed and lumpy, and the ureters, as mentioned before, are deep in the corners of this triangular-shaped cavity.

* Author, "Case of Tuberculous Exfoliating Cystitis," 'Path. Trans.,' vol. xxxvii, p. 310.

† Author, "Atresia (Congenital ?) of the Vesical Orifice of the Left Ureter," *ibid.*, p. 300.

PLATE VI.

FIG. 1.



The prism is drawn within the urethral orifice, and the reddened plicated edge of that opening is seen on the yellow background of the posterior wall.

FIG. 2.



Scattered, distended mucous crypts on the bladder base.

CHAPTER VII.

THE VISUAL FALLACIES OF ELECTRIC CYSTOSCOPY.

UNREMITTING practice with the electric cystoscope is a paramount necessity if real accuracy in the visual diagnosis, prognosis, and treatment of obscure urinary disease is aimed at. The appearances which the mucous membrane is wont to assume under the varying conditions of relaxation, congestion, extravasation, and infiltration are often perplexing, and to the casual observer very misleading. Hence, although a novice may readily recognise a typical growth or a stone by means of the cystoscope, he may as readily blunder over such obscure conditions as are met with in chronic cystitis, tuberculosis, encysted stone, or disease of the renal pelvis and ureter, as shown in the ureteral orifice.

In order to accentuate this statement, I wish to record three cases from the practice of three surgeons who took special interest in electric cystoscopy, and who had a fair amount of material to gain experience from. The first includes an opinion of the late Mr. Berkeley Hill.

I was asked by a colleague to examine A. M—, æt. 32, in November, 1890. Six months before I saw him he began to have pain at the top of the penis when he made water, a scalding pain being left in the same position after micturition. This gradually got worse, and he began to pass "mortar." Then he had pain in his left side. Three months after the onset, a few drops of blood appeared at the end of urination; there was no straining. When I saw him first he was passing water every two hours in the day

and had to rise thrice in the night. He had moderate pain in the glans after micturition, and occasionally passed blood. He showed me large pieces of necrotic débris, permeated with phosphate of lime salts, which he had passed. Prostate and testes normal; urine acid.

On cystoscopy I discovered a crateriform ulcer with an upraised gelatinous edge. At the inner and upper part was an adherent milk-white, phosphatic, necrotic tag. The base of the ulcer was irregular, but showed no granulations. It was apparently excavated mucous membrane. The thin inside edge of the ulcer was very sharp, and on the outer side was a small blood-clot, evidently the site and plug of a hæmorrhage a few days back.

I did not know the nature of the ulceration, and said so. I entirely disagreed with the diagnosis given by my colleague, that it was a villous growth.

Naturally dissatisfied, the patient went elsewhere. I traced him to the University College Hospital, where Mr. Berkeley Hill diagnosed a villous papilloma by means of the cystoscope. He performed supra-pubic cystotomy, and demonstrated the papilloma. It was removed, and the report of the pathologist was that it was a typical specimen of that growth. In six months there was a recurrence, and in nine months a second supra-pubic operation was required. On this occasion a growth was found infiltrating the wall of the bladder so deeply that removal was impossible. He now returned to his medical attendant, Dr. W. R. Cooper, of Norbiton, who, on hearing of my interest in the case and of the lamented decease of Mr. Berkeley Hill, asked me to see him. The patient was then (January, 1892) losing flesh; the supra-pubic wound was tucked in as one sees a nipple drawn in in scirrhus of the breast. This I afterwards proved to be due to a tough epitheliomatous deposit in the track of the bladder wound. I watched him for eight months, and finally obtained the autopsy nearly two years after my original cystoscopy. The bladder was filled with hard epithelioma, and the supra-pubic scar had been invaded as well. I know now that that case was originally a hard epitheliomatous ulcer.

I heard in 1892 that a patient, a medical man who was suffering from hæmaturia, had been examined with the cystoscope by a surgeon of large experience in urinary disease—a surgeon whose lectures and writings on the cystoscope showed that he had acquired much knowledge of the innovation. He had made the diagnosis of villous tumour, and had considered the growth so typical that he had secured the services of a good artist to sketch it in colours. The sketch was made and considered excellent. On

supra-pubic cystotomy the surgeon could not find the growth. The bladder was the seat of tuberculous ulceration. I learnt the above from the medical men in charge of the case, and from the artist, who was also a medical man.

A patient was brought to me with profuse symptomless hæmaturia. He had been examined by a surgeon who had also published largely on cystoscopy, and had made in this instance a diagnosis of left renal hæmorrhage. The patient, however, demurred to the left-sided nephrectomy which had been proposed, and came to London for another opinion. I found the hæmorrhage pouring from the right kidney, and removed that organ. It was much atrophied and inflamed. He completely recovered.

Such cases are three out of many that have come under my immediate notice. Of my own mistakes I cannot speak with the same accuracy, for although each patient has been furnished with a written diagnosis if I have examined with the cystoscope, yet I find it difficult to trace those cases which I have thought were doubtful. I have, however, cut into bladders three times in the earlier part of my cystoscopic education, expecting to find the tumours I had so confidently demonstrated. The first case was tuberculous, and the other two were merely thickened lappets of mucous membrane the result of chronic inflammation.

I have adduced sufficient evidence to show how important it is for each surgeon to accumulate visual experience for himself by constant practice, and on these grounds I have thought it advisable to allude briefly to the various pitfalls which meet one at the very commencement of the study of cystoscopy. These visual fallacies in electric cystoscopy may be grouped under two headings; 1. Those encountered in the healthy bladder. 2. Those met with in the diseased bladder.

1. The Healthy Bladder.

(a) *The Ureteric Cone*.—The first normal pitfall to be avoided is a protuberant ureteric orifice. The vesical opening of the ureter usually appears as a thin line or slit in fully distended healthy bladders, and as a pouting thick-lipped orifice in all partially distended bladders.

Even in perfect health it may be seen under the latter condition as a red, gelatinous-looking cone, more or less obtruncated (Plate V, A). It is then very like a small sessile tumour; in fact, in one case of hæmorrhagic cystitis, I had some difficulty in dissuading the surgeon who had "discovered" a very projecting ureteric cone and had diagnosed it as a villous papilloma, from ablating it. The similarity is much increased by the magnifying power which the prism possesses. The cause for this appearance is most probably to be found in the adherence of the mucous membrane to the trigone, and the laxity of the same in other parts of the bladder. When the bladder is only partially expanded the mucous membrane becomes rolled or heaped up at the fixed points, such as the orifices of the ureters and the urethra. To recognise the ureteric cone, the cystoscopist notes that its position corresponds to the postero-external angle of the trigone; that the summit is slightly flattened and occupied by a small orifice, whence tiny jets of glycerine-like fluid issue at varying intervals; and, moreover, that the apex not infrequently protrudes and recedes rhythmically. Occasionally these appearances may be accentuated in patients passing uratic urine from one kidney, or in those whose renal pelvis is irritated by some phosphatic calculous deposit.*

CASE 1.—Mr. R. Mc—, æt. 22, consulted me on account of his passing large quantities of urates, with considerable disturbance of health. He suffered much pain in the back and burning pain in the testicles, and stated that he experienced a difficulty in finishing making water. Cystoscopically the mucous membrane of the bladder appeared to be glazed and cracked; the left ureter projected into the bladder like a turgid mammary nipple, the apex protruding and receding at each efflux of urine from its mouth. The right ureter appeared normal.

CASE 2.—Mr. W—, æt. 54, a patient of Dr. Warner, of Woodford. Two years before I saw him he was suddenly seized with left nephritic

* Compare the description of pathological conditions of the ureteric orifice in the chapter on this subject.

colic, since which time he has only had two bad attacks. He was troubled, however, with a continual pain in the left side, which he could cover with two fingers. "The left ureteric cone protrudes, the efflux is rapidly repeated, but feeble and murky. The right orifice is flattened. The bladder is healthy, a deepish post-prostatic pouch is present, no stone is in it." The knowledge of this pouch permitted me to warn the patient of the chance of it forming a trap for any stone entering the bladder after a severe attack of colic. Pieces of stone ultimately came away, and the pain was almost entirely relieved by the exhibition of alkalies.

(b) *Rugæ*.—The healthy, lissom, inelastic mucous membrane, when folded in by the contracting muscle tunics, forms creases, plaits, and wrinkles, which are sometimes caught sight of in profile, and which then appear like rows of papillomata. By turning the prism so as to full-face them the deception is detected. When these rugæ are inflamed or swollen their appearance is still more puzzling (*vide* p. 104).

(c) *Deposit upon the Walls*.—It may happen to others, as it has to me, that instead of washing out the bladder, I have taken the patient's word for it that the urine is quite clear, and on introducing the cystoscope I have found the water murky with phosphates or urates. In other cases I have seen the surface of the bladder powdered over with such deposits, and the water quite transparent, a condition which is apt to deceive one into the belief that the mucous membrane is blurred with inflammation. A similar state of urine exists sometimes in tuberculosis of the kidney. The urine passed looks clear, but on introducing the light the surface is covered with streaks of filmy muco-pus or white sloughs deposited from the urine. In some instances it is powdered with multitudes of small, roundish, whitish bodies, as if that sweetmeat known to children as "hundreds and thousands" had been dredged on. Whether these particles are the shavings out of innumerable small ulcers or gland casts I am unable to say, but I have generally noticed them in cases of tuberculous ulceration.

(d. A more puzzling and important deposit is that of blood. A thin adherent layer of renal blood or a deposit of altered blood will completely change the appearance of an otherwise healthy mucous membrane, deluding the observer into the belief that he has to deal with an old-standing cystitis, with congestion of the mucous membrane. A blood clot can easily be mistaken for an oxalate of lime calculus.

(e) *Mucus*.—Ropes and streamers of mucus in the healthy bladder are easily recognisable, but when cystitis is present and much grit or phosphatic powdering is intermixed with the mucus, it not infrequently increases the apparent size of a growth, stone, or ulcer, or entirely conceals these conditions.

2. The Diseased Bladder.

Rugæ.

Not infrequently in hæmorrhagic cystitis, or in localised acute cystitis, parallel rows of purple or blood-red rugæ are seen, and these if caught sight of in profile resemble villous papillomatous processes very markedly. This condition and fallacy are very well illustrated by the following remarkable case, for the notes of which I am indebted to Dr. Houston Davson and to Dr. W. D. Waterhouse, under whose joint care the lady came.

Mrs. H—, a native of Demerara, æt. about 40, married, had suffered from frequent slight attacks of ague, otherwise her general health had been good. She was seen in the last week of May, 1888, by Dr. Waterhouse for an attack of vaginitis, which got nearly well in a week, but which was followed by general abdominal pain. There was constipation, the motions being hard and covered with blood-stained mucus. There was also œdema of the anus. Two days afterwards she suffered from an attack of biliary colic, with intense paroxysmal pain, nausea, and slight jaundice. The liver was enlarged and tender. No gall-stones were discovered in the motions; the urine contained bile. Hardly had this attack subsided before intense pain was experienced in the right kidney. Blood appeared in the urine, and from time to time it was very

profuse in its amount. At times, however, the urine was quite clear, sp. gr. 1025, no albumen, pus, mucus, or sugar; neutral. The pain in the right kidney could be traced by the patient in the course of a day or two along the right ureter to the bladder. Finally the bladder became involved, and each act of micturition was attended with the greatest agony, opiates being indispensable in one form or another.

As these distressing symptoms continued for over a fortnight, a physician was called into consultation, and the diagnosis of right renal calculus was made. As it seemed probable, from the extreme frequency and pain in micturition, that the stone had descended into the bladder, I was asked to examine with the electric light and deal with the stone. My notes of the case run as follows:

"The onset symptom was five weeks ago. The patient has a number of sisters, all of whom have had tumours or cysts of the ovary. There is much blood (of vesical origin) in the urine, but the stream is never suddenly stopped as if by the corkage of the urethral orifice by a stone. All the symptoms are those of renal stone entering the bladder, but the vesical symptoms are far in excess of any which could be excited by a small renal concretion in a healthy bladder. They are more likely those induced by an acute inflammation of the ureter bursting upon the bladder."

On introducing the cystoscope and turning it towards the right side of the bladder, the following extraordinary appearance presented itself:—Starting from a point a little above the right ureteral orifice, and running nearly parallel with each other, were innumerable upraised plicæ of a deep blood-red colour, the mucous membrane between the ridges being of a bright crimson. The colour faded towards the mid line into a perfectly healthy, glistening and expanded mucous membrane, lining the left side of the bladder.

"The thick blood-red plaits or rugæ of mucous membrane were evidently the expression of an intense inflammation which had broken in upon the bladder from the right ureteral orifice and had expended its force upon the adjoining area. Unless I had seen this condition, which Drs. Davson and Waterhouse corroborated, I could not have believed it possible that one half of the bladder could be perfectly healthy and fully distended whilst the other was contracted and its mucous membrane crumpled and turgid with inflammatory exudation and extravasated blood. The bladder must when distended with water have had somewhat the shape of a cottage loaf on its side. No stone was present. The right ureteral orifice was deeply buried in an elevation of swollen mucous membrane. My diagnosis was that the right renal pelvis had, either from

contiguity to the liver or sympathy with it, become affected with precisely the same acute inflammatory changes, probably malarial, as the vagina, the gut, and the gall-duct. I also argued that as the mucous membrane of the bladder on the left side was now healthy and showed no trace of infiltration or hæmorrhage, notwithstanding the rapidity with which the bladder had been affected a fortnight previously, the disease was at a standstill, and was most probably subsiding. Alkalies, and subsequently quinine, were ordered. The patient began immediately to mend,—not, I believe, due to the change of medicine, but rather because the violence of the attack had expended itself, as indicated by the cystoscope,—the paroxysms of pain diminished, the blood disappeared, and the patient was convalescent in ten days. She has since remained well."

I have purposely given this case in full and just as it was inserted in my book on 'Electric Illumination.' I have since studied the subject more accurately, and allude to it in discussing cystitis (*vide* p. 123).

Polyhedral or Rectangular Quillings of Chronic Cystitis.

Instead of the mucous membrane becoming raised in parallel rows, it not infrequently takes other and less easily recognisable forms. In proportion as it becomes swollen and gelatinous in certain forms of chronic cystitis, so does it form lumpy projecting swellings in the *semi-distended* bladder. The appearances these present are, of course, protean; but the most common is that of polyhedral or rectangular quillings, the swollen and almost translucent tissue enclosed between the depressed seams or puckers being thrust forward as globose or polypoid bodies, not unlike the vesical myxomata in children. This condition is best marked on the base and posterior wall.

C—, male, under Dr. Sutton. Had lithotripsy performed thirteen years ago; no trouble until three months ago, when he began to suffer from irritability of the bladder, the calls for micturition being every twenty minutes. He had pain, but not very severe in character, at the tip of the penis and supra-pubically.

He had never seen blood in the urine; the water was muco-purulent. Prostate hard and small; base of bladder posteriorly felt thick. The bladder capacity was four ounces. Many small rolled pus flakes in washings of bladder. Cystoscopy: "The bladder is free from growth, the trigone is puffy with congestion, the posterior wall is unnaturally white and gelatinous; it is crumbled and rucked up into œdematous projections with deeply cut intervening furrows."

Again, these projections may be massed together, and of such uneven lengths and varied shapes that they resemble most strongly a group or patch of gelatinous polypi.

Lastly, they may be mere conical or blunt-topped protuberances of a more or less permanent character, which I have most often noticed near the base, and of which the following case is an example:

Mrs. U—, æt. 32. In April, 1888, after six weeks of causeless ill-health and languor, she passed without any warning, bloody urine of a bright red colour. She had had no previous frequency of micturition, nor had she suffered any pain anywhere; had she not happened to have noticed the blood in the chamber she would not have known of its occurrence. Fourteen days after the onset she consulted me. The urine was then translucent, and of a rosy red colour. The hæmaturia was intermittent, usually appearing every evening towards five or six o'clock, though sometimes it was noticed throughout the day. Occasionally a cold shiver ran through her a few hours before the blood appeared. On examining with the cystoscope, the bladder was found to be perfectly healthy and the bleeding to be renal, but at the base I noticed a condition of mucous membrane I had not met with before, and which I noted as follows:

"The mucous membrane of the base is whitish, and looks œdematous; the surface is covered with innumerable rows of stunted, conical elevations."

A few doses of ergot and ammonia checked the hæmorrhage for a year, and I saw nothing further of my patient. She caught cold in May, 1889, and returned for treatment of a precisely similar attack. I seized the opportunity of re-examining the bladder with a cystoscope

and found it quite unchanged. The same stunted conical projections were visible, scattered over the trigone; the patient did not suffer from either pain or frequency. Eight years later this patient came again under my care with a typical tertiary ulceration of her fauces which healed under potassium iodide. There had been no recurrence of the hæmorrhage. It may be that syphilis played some part in the production of this appearance.

The Encrustation of Abrasions and Ulcerations of the Mucous Membrane.

The surgeon must guard himself against mistaking for stone the heaped-up crust of phosphate of lime which forms on abrasions, such as are noticed on prostatic bars, collars, median lobes; or that which accumulates on chronic ulceration (solitary simple ulcer, tuberculous ulceration). These may occur in neutral or even faintly acid urine, and are the evidence of alkaline tides and a roughened surface. All such are *flat* surfaces.

I have seen heaped-up *clear* crystalline uric and oxalate of lime crystals upon abrasions and even growth, as well as the dead-white phosphate of lime.

In one case brought to me by Dr. Crawford, of Pembury, the uric acid crystals had formed into such masses that they could be rung with the sound, and could easily have been mistaken for stone. On cystoscopy five separate large pea-sized collections of crystalline plates and spicules could be seen embedded in a villous-covered carcinoma. The urine was neutral and sterile. The collections were freed by the point of a sound, and sucked out through a No. 16 E lithotripsy cannula.

The Encrustation of Vesical Growth.

The deposition of dead-white phosphate of lime upon necrotic new growth is a real pitfall to the cystoscopist. A mass of white stony material is seen; it is tapped

with the beak of the instrument, it gives a dull sound as if a phosphate of lime stone had been struck, and the diagnosis is supposed to be complete.

More careful observation of the white mass will show that peeping out here and there are the bare lobules of uncovered growth. Moreover, the sound will demonstrate its fixity; the finger, *per rectum*, will usually detect a hardness of the vesical walls on the side and at the position where the white mass was discovered. In nearly every case the clinical history will show that the first symptom consisted in an attack of *painless hæmaturia*, and that the urine has all along been remarkably free from muco-pus. I quote two of my earliest cases to exemplify the difficulty.

Encrusted alveolar carcinoma; Supra-pubic removal.—R—, æt. 43, kindly referred to me by Dr. Fly Smith. Prior to two years ago the patient was in perfect health. On passing water one morning before breakfast at this date he noticed that the urine contained bright red blood. The blood was not in clots, it was intimately mixed. He could not account for the hæmorrhage. He saw no more blood, but began to experience pain after passing water—not during the act. It started at the neck of the bladder and travelled to the tip of the penis, leaving almost as soon as it had reached the glans. The frequency of micturition in the day was very variable; sometimes he would have to urinate four or five times an hour, sometimes he could retain his water for half an hour, very rarely for an hour, but never longer. At night he would rise three times. He applied at a London hospital and was admitted. He stated he was sounded every day on which the surgeon visited his ward, "so certain was the surgeon in charge of his case that he was suffering from stone." He remained there six weeks. He got better, and for eight months was perfectly free from his complaint. At the expiration of this time all the symptoms of frequency recurred, and he applied to St. George's Hospital, where he was admitted and remained ten weeks. He was sounded, and ultimately got quite well. This was in November, 1887. In July, 1888, after a period of seven or eight months of perfect freedom from all the symptoms, he noticed on going to bed some bright red blood in his urine. He came to me July 16th. On introduction of the cystoscope, and without rotating

it, there was seen upon the superior wall a roundish whitish-grey mass the size of a walnut. It appeared to be situated on a shelf of dark red mucous membrane. I could not quite make out if it was projecting from the mouth of a diverticulum, nor did I know whether I was dealing with a phosphatic-encrusted growth partially hidden by transverse folds, or an encysted calculus. I therefore introduced a sound and directed its beak towards the spot, but elicited no click of calculous material. On August 27th, six weeks after, I made, in conjunction with Dr. Fly Smith, an examination under ether. The size of the body had increased, and it was obviously a tumour. It still rested upon a shelf of purple mucous membrane. Its sides were covered with thin floating films of mucus. I verified the position and character of the growth by supra-pubic cystotomy, removing it with its base. The growth eventually recurred, and a post-mortem established the diagnosis of vesical carcinoma.

Profuse hæmaturia due to stone-capped epithelioma.—W. S., æt. 35, came to St. Peter's Hospital complaining of hæmaturia and post-scrotal pain of three months' duration. Three and a half months ago he felt a sudden "stitch-like pain" in his left side, and a quarter of an hour after he passed water of a beef-tea colour. Nine days after this, on returning from a long walk, he passed pure blood at the end of making water. He had then no pain and no frequency. The bleeding disappeared. In seven days' time he had another and a precisely similar attack. He consulted various medical men and attended St. Bartholomew's. He was sounded with negative results by a very capable surgeon, and did not bleed after the instrumentation. Gradually post-scrotal pain was felt on micturition, and the blood became constant.

When I saw him he was passing water every hour or every hour and a half, and getting up four times at night. Residual urine amounted to two ounces. As the symptoms were not characteristic of stone I examined him with the cystoscope first, and saw a brownish, irregular body enveloped in a haze of mucus, which no amount of washing out would remove. The body sprang from the left side of the base of the bladder by the left ureter. I was uncertain as to whether I was dealing with a phosphatic, blood-encrusted growth or an encysted calculus. On passing the sound a stone could be felt far back in the bladder on the left side. *Per rectum* a hardened lump could be felt in the corresponding area. The patient was admitted into St. Peter's Hospital under the care of my late senior colleague, Mr. Coulson, who introduced a lithotrite, but the body

could not be grasped in any position of the instrument. The male blade scraped the surface, bringing away brownish muco-phosphatic material. The cystoscope was again used, and the track of the lithotrite jaw could be seen upon the surface of the projecting nose of a tumour. Next day the patient passed a quantity of calculous material like split percussion caps. He died uræmic in a week, and I found on post-mortem a broad-based epithelioma, the lobules of which were capped with thick concave crusts of lime phosphate.

Congested Areas due to Light or Heat.

One of the important visual indications of early *primary* tubercle of the bladder, in my opinion, consists in congested areas on the postero-superior wall. These are obvious infiltrations. They are flat, and of a dull red colour, shading off imperceptibly into the glistening healthy mucous membrane around. Unfortunately the light or heat of the lamp if kept near the mucous membrane for any length of time (one to two minutes) is apt to produce a similar appearance.

Submucous Hæmorrhages.

Localised hæmorrhages in the submucous tissue are sometimes very difficult to interpret correctly. These are usually observed in hæmorrhagic cystitis, in some forms of tuberculosis, and in the rare cases of purpura (No. 3601, Hunterian),* and syphilis. They form elongated, oval, or roundish elevations of a deep red gelatinous aspect, very similar to epitheliomata. The neighbourhood of the former is, however, usually printed with hæmorrhagic spots, streaks, and blotches. The remaining surface is, moreover, blurred, and shows evidence of sub-acute cystitis.

Tuberculosis.

Of all the pathological changes of the mucous membrane which need most study, and to which the eye must be carefully and specially trained, those due to tuberculous disease are the most important. Unfortunately this

* Cf. Author, 'Path. Trans.' vol. xxxviii, 1887, p. 189.

disease resents instrumental interference of any sort, so that if the diagnosis is clearly made out to be tuberculosis by such objective and subjective symptoms as deposit of crude tubercle in the testis or prostate, with co-existing extreme irritability of bladder, pain in micturition, and puriform bacillary blood-stained urine, it is wiser to forego the examination with the cystoscope than to run the risk of exciting inflammatory change in a possibly damaged kidney.

Partly, therefore, because few suitable opportunities for the study of vesical tuberculosis will present themselves, and partly because this somewhat rare disease offers in every grade of its severity and in every stage of its progression towards resolution or suppuration, appearances which counterfeit those recognisable as characteristic of many of the complaints for which a cystoscopic examination would be undertaken, it will most likely be in this disease that the greatest number of mistakes in diagnosis will be made.

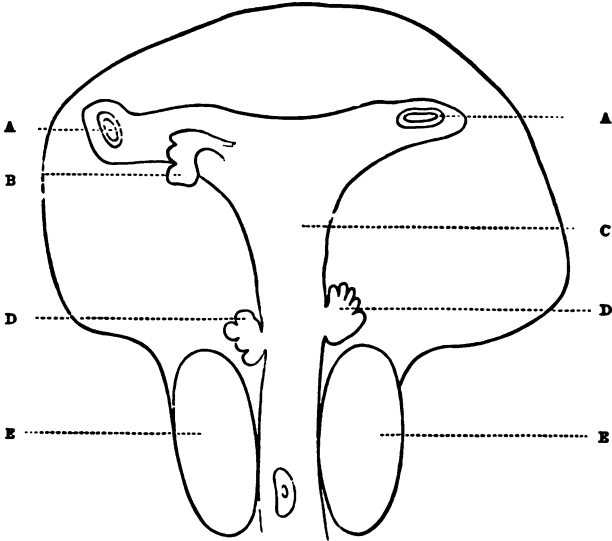
(1) Heaped-up, cockscomb-like projections of swollen mucous membrane mimic the stunted villous papilloma, and swollen tags of mucous membrane freed by ulceration exactly resemble small polypi. But villous papilloma and true polypi *never* co-exist with tuberculous ulceration. The extreme difficulty which the inexperienced eye may thus encounter will be well illustrated by the two following cases, the first of which is extracted from my post-mortem book, and the second from my case-book.

J. L.—, æt. 27, had had evident signs of tuberculosis of the urinary tract for four years, testes and vasa deferentia being uninvolved. Nephrotomy was performed by a colleague for a large right-sided pyonephrotic sac, and the man gradually sank. *Autopsy*.—Right kidney: Disorganised renal substance replaced by large tuberculous abscess cavities communicating one with the other. The right ureter was coated with the usual curdy deposit, and almost occluded in its upper third by a mass of similar deposit. Left kidney and ureter healthy.

Bladder: On opening the bladder it was seen that the entire

mucous membrane had been cleanly dissected off by inflammation and ulceration from the subjacent muscle planes, except at the trigone. The trigone presented a somewhat unusual and striking

FIG. 55.



Trigone of bladder of T. L.—.

appearance (Fig. 55). The mucous membrane covering it had been loosened from its attachment at the sides of the trigone, and thus presented a fimbriated edge, which terminated at the mouth of the bladder in two auricular-shaped appendages of scarlet colour, evidently the injected and crumpled remains of the circumjacent mucous membrane (D, D'). There was a small polypoid tag on the interureteric bar (B). It was noticeable that the right ureteric opening (A) had been displaced outwards from its natural position, most likely by the circum-ureteric infiltration on that side. There was a yellowish mass of crude tubercle under the mucous membrane of the prostatic urethra, and the right lateral lobe showed two horse-bean-sized deposits of the same material. The vesiculæ seminales, vasa deferentia, and testes were entirely free from disease.

R. D—, æt. 26, had been under the care of, and was kindly referred to me in May, 1888, by Dr. Shalders Miller, of Windsor. Seven years prior to this the patient began to suffer from pains in the left loin, coming on gradually. He also experienced a difficulty in

making water, so that he was led to believe an obstruction existed at the neck of the bladder.

Shortly after the onset of the symptoms, on rising one morning he found himself quite unable to pass water. After much straining he voided a quantity of blood-clot and urine. The bleeding continued. Sometimes it was arterial in character. Sometimes the blood appeared in the middle of a clear urine stream, and sometimes at the end. Often it was intimately mixed and of a darker colour: usually in the morning it was a dirty brown. After a month's medicine the urine became quite clear and remained so, but the pain in the tip of the penis did not abate. This was more especially noticeable when he was working at his trade, blacksmith. He volunteered the information that striking at the anvil and filing at the vice "shook something in the bladder and he felt it in the penis." He had this pain for five years, though it varied in its position. Sometimes he was quite free from blood. He had several attacks of retention from clots. He married in 1886, though bleeding profusely at the time. Although the hæmorrhage then ceased for a short time, it recurred in a month and continued until I saw him. The frequency of micturition was every ten minutes, unless prevented by morphia suppositories.

Before being sent to me he had been the inmate of two hospitals. At one he was considered to be a malingerer; at the other (St. Thomas's Hospital) ulceration of the bladder had been diagnosed by Sir William MacCormac. Dr. Miller had diagnosed a growth at the left side of the base, obtaining evidence of its presence by introducing a large steel sound into the bladder and his finger into the rectum.

He was admitted into the hospital under my care in order to have cystotomy performed. No testicular or prostatic deposits were found. The urine contained blood and muco-pus. On passing a No. 30 (French gauge) electric cystoscope I found "chronic swelling of the mucous membrane; the left ureter was somewhat like a retracted nipple, being buried in a congested heap of purple velvety mucous membrane. Upon the interureteric bar was a small polypoid tag, and a little lower upon the trigone a warty condition which was made up of several parallel rows of pinched up, deeply injected mucous membrane. Further to the left of the left ureteric orifice and more posteriorly placed was a large crateriform ulcer, the edges of which were jagged, everted, swollen, and gelatinous-looking. Its aspect altogether was very similar to the scar on the target of a bullet impaction. I had but little doubt of the tuberculous nature of the ulceration.

I performed the boutonnière operation in order to scrape away

the growth and to drain the bladder and allow the ulceration to heal. He was much improved by the operation, but a troublesome fistula resulted, which Dr. Miller succeeded in closing with the galvano-cautery wire.

His bladder symptoms were relieved, but he died of phthisis on the 10th February, 1899; the entire duration of the case being seventeen years.

(2) The short and tag-like streamers of necrotic tissue of tuberculous ulceration resemble the necrotic villi or shredded ulceration of neoplastic surfaces.

Enlarged "Middle" Lobe of the Prostate.

It might seem superfluous even to mention that the middle lobe sometimes forms a projecting, often more or less sessile mass, resembling a malignant growth which is breaking through the trigonal tissues from the prostate. Indeed I can conceive of no greater difficulty in cystoscopy than to decide as to the benign or malignant character of an *ulcerated bleeding* growth in this position.*

In such a case it is worth while to remember that prostatic carcinoma breaks through the trigone about its middle or more towards its base (interureteric bar),* whilst the intra-vesical outgrowth of a fibro-myomatous prostate is encountered at the very entrance to the bladder. The cystoscopist would act wisely if he allowed himself to be biassed more by the history and symptoms of the case than by the aspect of the tumour as revealed by electric light. In some of the denser forms of prostatic carcinoma, the symptoms of which generally simulate enlarged prostate and stone, it will be found that it is impossible to introduce the electric cystoscope into the bladder, even under ether, without undue violence.*

* Cf. author, "Primary Malignant Disease of the Prostate Gland: a Clinical Study of the First Fifty Cases which have been under the Writer's Care and Observation," 'Edin. Med. Journ.,' July, 1899.

CHAPTER VIII.

THE EDUCATIONAL ASPECT OF THE ELECTRIC CYSTOSCOPE.

I BELIEVE that at first, the electric cystoscope was regarded by most of those who accepted its *bona fides* merely as an instrument whereby an accurate diagnosis of obscure urinary complaints could be obtained without a cutting operation. It soon became apparent, however, to the few who enjoyed extensive clinical material, that this was a very restricted view of its value or of its use. As the phases in the progress of urinary diseases were more carefully studied with the cystoscope, and as each symptom complained of was more or less accurately assigned to its proper cause, it became obvious that the instrument was destined to alter very materially the accepted teaching of the symptomology of these diseases. Very soon after its introduction to the profession in England * I realised its value in this, its educational aspect, and commenced to utilise it freely in watching the progress of all forms of renal and vesical disorders.

My work in this direction has proved most interesting to me, for there are, to my mind, few mental pleasures greater than that which is involved in the personal acquisition of absolute facts and in their accurate arrangement in natural sequence. The accumulation of cystoscopic details is comparatively easy, but the difficulty of obtaining visual veracity, and of thus avoiding wrong conclusions, can only be overcome by the patient examination of large series of similar cases.

To escape as far as possible from the temptation of

* Fenwick, "The Value of the Nitze Method in the Diagnosis of Obscure Vesical Disease," Brit. Med. Journ. April 14th, 1888.

forcing facts into preconceived patterns, I have sedulously followed the plan of writing down bald statements of the urinary symptoms complained of by each patient, and of placing opposite these the cystoscopic appearances of that particular patient's bladder, ureter, and urethra. I have seen certain symptoms so often associated with certain appearances of the mucous membrane that I am led to believe they might well be elevated to the rank of fixed clinical features. I venture now to offer, as a contribution to the more accurate delineation of the classical types of urinary disease, the following rough but faithful outlines which my own experience has permitted me to draw.

Pathological Conditions of the Living Bladder as seen by Electric Light.

(An asterisk denotes that the affection is comparatively rare.)

Before referring to the inflammatory and neoplastic changes of the mucous membrane of the bladder, I propose alluding briefly to three striking changes which the cystoscopist may meet with and may wrongly deem important.

****Argyria of the Mucous Membrane.***

This is defined as a chloasma or discoloration produced by the prolonged application of nitrate of silver, the molecules of silver being deposited in much the same position as those particles which furnish the natural pigment of the skin. It is a fashion with some surgeons to advise the routine use of nitrate of silver as a bladder wash, and this is often employed by the patients for long periods. I had no idea until I used the cystoscope of the colour-change which this chemical produces on the mucous membrane of the orifice of the bladder. After prolonged use the surface adjoining the orifice of the bladder assumes, if I may judge of colour under the light of an electric lamp, a dull dark grey, even black. Relieving the deadness of the colour are the sharp pro-

jecting bluish lines of engorged vessels. The entire trigone is soft and greatly swollen.† I have never seen the discoloration extend beyond the base.

In one case, in which a surgeon had treated a patient aged twenty for a solitary ulcer of the bladder with an injection of nitrate of silver (gr. $\frac{1}{2}$ @ 3j) every day for two years, I found the bladder orifice and adjacent trigone *black*; and in manipulating the cystoscope I knocked off accidentally a pellicle of the epithelial layer. The raw surface exposed was of dull red; it formed a striking contrast to the blackened area around.

Methylene blue seems to stain the surface of raw or denuded patches a faint green, probably by acting on the mucus, coating these abraded surfaces. This may prove of clinical value in rapidly marking out areas which have lost their sheen or protecting epithelium in the same way that phosphatic crusts denote the site of eroded patches.

**Adenoids of the Bladder.*

The bladder base is heaped with tiny protuberances; the posterior wall low down is sparsely dotted with scattered clumps, which resemble in colour, shape, and probably in structure, the adenoid growths in the naso-pharynx of a child. Exception may be taken to this designation, but in place of a better, I venture to ascribe this term to this rare cystoscopic appearance. At first I considered it to be a change in the mucous glands, but subsequent experience disqualifies this view. "Every part of the bladder, except the trigone," to quote from my original case,‡ "was of a dazzling milk-white colour. At the left side of the trigone the vessels, which are remarkably sparse elsewhere, are here thick and branched. Situated on one of the branches of a vessel is an apple-jelly-coloured body the size of a split

† Withdraw the prism well within the orifice, the lamp is now above the mucous membrane and the eye below. Translucency and succulency is then easily gauged.

‡ Fenwick, 'Atlas of Cystoscopy,' p. 42.

PLATE VII.

FIG. 1.



"Adenoids" of the posterior wall of the bladder.

FIG. 2.



A small-stalked fibro-sarcomatous polypus.

pea (Plate VII, fig. 1). It seems to have some connection with the vessel, and reminds me of the Malpighian tufts of an injected kidney. On bringing the prism lower down past the ureter, along the edge of the trigone, these small bodies are more numerous, the vessels being split and resplit into branches, and on each twig are several of these flattened ovoid bodies. On the trigone itself, towards the orifice of the bladder, these bodies are collected into clumps, and here and there interspersed among them and raised from the surface are mucoid glands, distended with clear secretion and stained partially with the same colour as the bodies to which I have referred."

At first I called these "lupoid tubercles," for they reminded me of the isolated apple-jelly tubercles of lupus of the face, but I used this term merely to remind me of their appearance. Later, as I came across other cases, they struck me as being very like small isolated adenoids at the naso-pharynx, and, although I have no post-mortem evidence, I now take them to be lymphoid tubercles. Weichselbaum,[†] Chiari,[‡] Herrmann and Tourneux[§] have studied the subject in the normal bladder, and proved the existence of lymphatic follicles in the base. Przewski^{||} considers the condition pathological—it may be so; anyway, they do not seem to cause any symptoms. I have watched my first case for nine years. When he first came to me he was thirty years of age, and was apparently in the best of health, though liable to attacks of pain in the left kidney. The urine was generally clear, contained half albumen, was acid, and even when fresh it swarmed with micrococci. Occasionally he passed a cast of the ureter (?) in the form of slough. He also passed a stone from the left kidney. Gradually the adenoids disappeared. He is now well (1899), though the kidney still "grumbles."

[†] Weichselbaum ('Wien. med. Zeitung,' 1881, No. 38).

[‡] Chiari, 'Wien. med. Jahrbücher,' 1881, p. 9.

[§] Herrmann and Tourneux, 'Dict. Dechambre,' art. "Vessie," 1889, p. 212.

^{||} Przewski, 'Archiv für path. Anat.,' 1889, vol. cxvi, Heft 3 (Albarran).

My second case was a woman æt. 25. She was sent to me by Dr. Amand Routh for intermittent attacks of hæmaturia after exercise. Rest always checked the bleeding. She had had symptoms of a fixed right renal calculus for eleven years. The distribution of the adenoids in this patient's bladder was exactly the same as that in my first case, except that I noted the little masses to be distinctly larger, and more upraised on the right side of the base. The urine was normal except for a little blood and mucus. I lost sight of her for six years. She married and gave birth to a healthy child, after which the blood ceased, pus appeared in the urine, and severe pain was felt in the right kidney. Finally she returned to my care with well-marked pyelo-nephritis, and I removed the right kidney. It proved to be a multilocular shell surrounding a large branched calculus. She has since been in perfect health.

I saw my third case with Dr. Clement Godson.

A lady, æt. 29, had a clear clinical history of left renal abscess. She had been treated as a case of chronic cystitis by a surgeon for some considerable time. The bladder was adenoid. The left ureteral orifice was plugged with muco-pus. I advised left nephrectomy. The left kidney was removed by another surgeon with success.

On the slender basis of five cases I infer that the adenoid appearance of the vesical mucous membrane is rare; that it is of no pathological importance; that it may be accentuated by irritating discharges from a diseased kidney, for in three of the cases the clumps were more marked on the same side as a disorganised kidney; and, finally, that it may disappear in course of time. The only caution I need add is that when the bladder is but little distended these adenoid masses clump together, and form a mass very similar in appearance to a bald fibro-papilloma or sarcoma.

Distended Mucous Crypts or Multilobar Glands of the Trigone (Plate VI, fig. 2).

Minute mucous crypts or glands exist normally in the bladder,† not only around the urethral orifice and on the trigone but sparsely scattered elsewhere. Occasionally

† Luschka, Henle, Krause, English, and Hoffmann all oppose Sappey in his assertion that such do not exist.

the orifice of a crypt becomes blocked, just as may happen in the urethra, and the gland swells like a minute ranula. It is no uncommon sight to come across one single one distended like a little grape on the edge or rim of an enlarged prostatic collar, or in groups upon a succulent irritated trigone. They may exist in the state of perfect bladder health, but usually they are indications of surface irritation or deep pressure. I introduce the subject because they sometimes appear in chronic cystitis, at the edges of tuberculous changes and in epithelioma of the hard variety. In both these latter diseases I have occasionally seen the surface of the edge of the morbid process glistening with these small distended grape-like cysts. Hence, whenever I meet them in the cystoscopic field accompanying ulceration I view them with suspicion, and am not content until I have satisfied myself that they are not indications of grave changes in the mucous membrane or submucous tissue.

Cystitis.

Before describing the classical divisions of cystitis it is wise to make the following important statement.

Sharply Localised Cystitis, both Acute and Chronic,† is not Uncommon.

It will be admitted, I believe, that the generally accepted idea of an inflamed bladder is one in which the entire surface of the viscus is involved. A vague expression, "inflammation of the neck of the bladder," is current, and conveys the impression that the mucous membrane around the orifice is the only area inflamed, participating usually in this instance in an inflammation of the prostate or the prostatic urethra, or in the female with slight urethritis. No more than this was meant in pre-cystoscopic times by the term "inflammation of the neck."

† It is better to consider localised chronic cystitis on page 132 immediately after the reference to chronic cystitis.

But the cystoscope shows that cystitis need not be a general inflammation of the bladder, that in many cases it is sharply localised and often limited to very small areas of the postero-superior wall. Nor does it follow that the affection, because it is thus limited, is necessarily confined to the surface only. I have seen cases in which an area varying in size from a threepenny piece to the entire half of the superior wall, so deeply infiltrated and inflamed, that the mucous membrane was folded into deep red or scarlet rugæ, and glued to the subjacent muscle planes. Let me pause to accentuate this statement. One sixteenth, one eighth, or one quarter of the bladder area may be so severely inflamed as to be a deep red, rugose, *inexpansile* surface, whilst the remaining area may appear glistening with health and be lissom in all its movements. It will be remarked that I expressly mention the postero-superior wall, for the statement that the circumurethral area can be locally inflamed in man and woman is generally accepted.

Clinical Observations.—These localised areas evoke, in proportion to the severity of the inflammation, all the symptoms of stone in the bladder. There is the same penile pain and blood after urination, the same frequency and strangury. Nay more, these localised inflammations may exist with very little change in the appearance of the urine. Often the urine is nearly clear, though sometimes a fair quantity of albumen† may be found on the employment of the nitric acid test. Careful cross-examination of the *onset* symptoms brings out a difference in the symptoms of localised cystitis and stone.

In localised cystitis the frequency, the glans or penile pain, and the blood after urination is sudden; it reaches its acme in a few hours. In stone the evolution of the severity of the symptoms is more gradual.

Causation.—As far as my knowledge extends, a sharply localised cystitis of the postero-superior (the

† Further clinical experience is needed to show as to whether the albumen is in proportion to the severity of the strangury in these cases.

"back") wall may be observed as the result of four different invading inflammations :

1. Descending ureteritis and periureteritis.
2. Contact-inoculation.
3. Cystitis by contiguity from pelvic inflammation.
4. Primary tuberculous cystitis.

1. **Descending Ureteritis and Periureteritis*.—The pelvis of the right kidney appears liable to become inflamed by contiguity with the bile-passages or liver in acute affections of this viscus. The kidney may or may not be involved prior to its pelvis. The inflammatory wave descending along the mucous membrane of the ureter implicates the bladder in the neighbourhood of the opening of that canal.

Cystoscopic.—The circumureteric area will be seen folded into dull blood-red ridges, the summits of which are pinched and sharp. These ridges are fixed, they cannot be expanded, and bleed if more than a gentle attempt is made to unfold them by water pressure. The ureteric orifice is buried in the swelling and is difficult to distinguish. The left side of the bladder affords a startling contrast by the brilliancy of its sheen, and by the mobility of its surface.

Clinical.—The symptoms are typical of the descent of a renal stone: First, renal colic, vomiting, reno-ureteric pain, retraction of the testis; then indications of the calculus entering the bladder, and evoking severe symptoms of cystitis. I quote a typical case on page 104.

I suggest that some of our *barren* cases of renal calculous colic, those in which all the symptoms of the descent of the calculus into the bladder can be traced by the patient, but in which the stone never appears and cannot be found by the surgeon, are merely instances of descending ureteritis, evoked by an attack of pelvitis due to calculus in the kidney.

**Periureteritis*.—I have on several occasions accidentally started an invasive cystitis by inflaming the pelvis of the kidney in septic cholecystotomy and nephrotomy.

Thus in one case, after operating upon a gall-stone impacted in the common duct in which a good deal of dissection was necessary, a sharp attack of cystitis followed: it cleared up in a week and the patient recovered. But it is particularly after explorations on the kidney (either) that I have been struck with the symptoms of descending ureteric stone, and have been urged to evacuate a stone which had descended. I have been able to prove that the symptoms arose from descending ureteritis and localised cystitis, and not from the transit and the trapping of a calculus in the bladder.

**Inflamed Appendix producing Periureteritis.*—I have operated on cases of inflamed appendices in the loin—not those dropping over the pelvic brim and becoming attached to the right side of the bladder—in which blood and frequency seem to have been caused by ureteric inflammation descending to the bladder. Though my experience of appendical disease in every grade is fairly large, this ureteric adhesion and inflammation has only been encountered twice.

2. *Inoculation Cystitis.*—I venture to suggest this name for a distinct class of localised cystitis. I have remarked in localised cystitis of the neck that the superior wall,

FIG. 56.



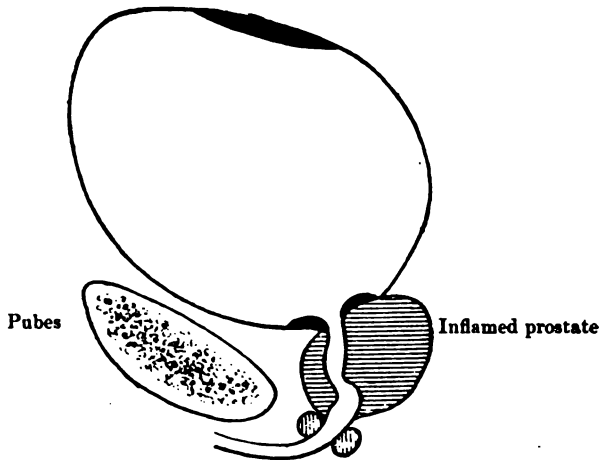
Bladder contracted and empty, with inflammation (blackened areas) at orifice.

high up in the middle line towards the summit, is similarly affected. The cause for these two independent surface inflammations is not at first sight obvious. But it is

plausible that the patch on the superior wall is inoculated from the inflammation of the area of the neck.

Probably the bladder on emptying assumes the "bellows" contour, that is the posterior wall contracts down on to the trigone and the shortened anterior wall (Fig. 56). The area opposite to the orifice of the urethra is inoculated, and on re-distension of the viscus the secondarily inflamed area is found high up on the posterior wall (Fig. 57). I have just seen this beautifully marked in a boy aged fifteen, with early tubercle of the posterior wall inoculating the orifice of the urethra.

FIG. 57.



Distended bladder, the posterior wall having been infected from orifice.

Other inoculation centres for inflammation, tubercle, and carcinomatous growth are to be found in the angle of the fold low down on the posterior wall, just where it doubles on itself in contraction. The right and left extremities of this fold are favourite sites.

3. *Invasive Localised Cystitis (Cystitis by Contiguity).*—In some instances the pelvic viscera of the female (uterus, tube, ovary) become inflamed and attached to the superior wall of the bladder. In both sexes simple ulce-

ration of the sigmoid or of the first piece of the rectum may cause adhesion of the bowel to the superior wall of the bladder, and the mucous membrane become acutely and locally inflamed. More rarely a long pelvic-placed appendix may inflame and similarly affect the superior wall of the bladder. If, therefore, a cystoscopist detects a localised patch of acute inflammation on the superior wall of the bladder, it should place him on his guard concerning inflammation of the pelvic viscera. He will notice that the inflammation is localised. He will estimate its severity and depth by the degree of the rolling in of the mucous membrane on evacuation of the contents of the bladder. I select a case from many such in my note-books.

Extra-uterine pregnancy (pseudo-intra-ligamentary) ; rupture ; coeliotomy ; cure ; subsequent left-sided localised transient cystitis ; cure.—J. W—, æt. 33, a woman who had had the right ovary removed in New York seven years previously, was sent to the London Hospital as a case of intestinal obstruction. The Surgical Registrar, Mr. H. Rigby, diagnosed the case as being one of extra-uterine fœtation, complicated by an acute attack of localised peritonitis. A tumour rose out of the pelvis on the right side, three fingers' breadth above Poupart's ligament; this was proved to be a hard, fairly moveable uterus, with thickened walls; the cervix was not soft. It was obviously being pushed up and to the patient's right by a swelling in the left broad ligament. The patient improved and refused operation, leaving the hospital at the end of three weeks. She returned at the end of a fortnight with symptoms of rupture of a tubal pregnancy. On opening the peritoneum I found a large amount of free blood and clot, and discovered and removed a five months' fœtus from the neighbourhood of the left kidney. The placenta was cleared out, tube and ovary removed, broad ligament pared and stitched, and abdomen closed. There was but little reaction. On the eighteenth day the patient complained of frequency of urination and severe meatal pain at end of the act. A small tender mass could be felt in the left anterior fornix. The gynecologist suggested abscess in site of broad ligament. On cystoscopy the right half of bladder was clear and healthy, left postero-superior wall was deeply inflamed, rugæ being fixed. I diagnosed a wave of invasive cystitis from left broad ligament. Hot vaginal douches relieved at once, and she left the hospital cured a fortnight later.

4. *Primary Tuberculous Cystitis*.—One of the most frequent causes, perhaps, of sharply localised cystitis is a *primary* deposit of tubercle in the bladder. It will be noted that I am not now discussing a descending renal nor an ascending genital infection. I wish to consider this and the entire subject more fully in its proper section. The most frequent position for a *primary* deposit of tubercle in the bladder of either sex is the middle of the superior wall. I have seen it there and recognised it as early as the fourth week of the duration of symptoms; the deposit appears as a sharply localised dull red patch the size of a threepenny piece. The mucous membrane is infiltrated, not merely congested; no amount of distension renders the patch colourless. The epithelium over the patch has been shed, or nearly so. Here and there a curled-up flake of white necrotic epithelium or muco-pus, partly free, partly attached, may be seen on this reddened area. The surface rolls easily and healthily on the subjacent muscle planes. Obviously the inflammation is neither deep nor severe. The bladder takes eight or ten ounces of medium easily. (Compare Plate IX and page 167.)

I propose now to allude to the cystoscopic appearances of the various grades of inflammation of the bladder.

Cystitis may be conveniently considered under the heads of acute, hæmorrhagic, and chronic cystitis.

Acute Cystitis.

This has been well investigated by Finger,[†] who restricted his examination to gonorrhœal cystitis. The appearances, according to that observer,[‡] are as follows:—The mucous membrane, in proportion to the extent and intensity of the process, is more or less affected. It is especially changed at the neck of the bladder, being there swollen into irregular hillocky projections. This turgescence is either marked with den-

[†] Finger, 'Wiener med. Presse,' 1880, S. 997.

[‡] I have never examined such cases.

critically anastomosing, greatly dilated vessels, or, in very acute cases, it is printed with hæmorrhagic spots, and streaks or blotches, or it appears of a uniform dark red colour. The epithelium is either collected in clumps or in long thready streamers, which float in the contents of the viscus.

Acute cystitis of other origin, or an acute attack grafted on a chronic form, have very nearly the same appearances, only the extent is more marked. These cases often present but little or no blood in the urine, although many blotches of extravasated blood are present.

Acute attack of cystitis grafted on a chronic cystitis.—The patient, a lady æt. 36, had suffered from frequency and pain in passing water for one year. She could hold her water sometimes for five hours, at other times a great frequency was noticed, and then she often cried out with the pain she experienced in passing water. This pain was at the meatus.

Eight days before I was asked to see her, she had been confined of a healthy child, the delivery being straightforward. She was suffering a great deal of pain on micturition. On examining the bladder I found the entire superior wall covered with large and irregular blotches of bright red hæmorrhage. The trigone was rucked up and of a dull dark purple colour and velvety aspect. So much was this the case towards the left side that it resembled a papilloma. No stone; no pain on examination; held six ounces of water with ease. Steadily improved under treatment.

By keeping cases under observation it will be found that these deep red blotchy extravasations diminish little by little as the intensity of the inflammation subsides, some of these patches taking, however, a very long while to disappear. There does not appear to be any scarring or local shrinking of the mucous membrane after absorption of these extravasations.

Profuse hæmaturia; submucous extravasation; absorption of same.—E—, æt. 34. Patient had suffered from recurrent and profuse hæmaturia for some months; generally pain before micturition. Had been sounded by several hospital surgeons. The hæmaturia subsided until it was reduced to the occasional passage of very small

tadpole-like clots. The cystoscope revealed the remains of an hæmorrhagic cystitis. Upon the trigone and in its left half was an elongated, oval, blood-red patch of upraised, injected, and swollen mucous membrane; it was well circumscribed. The surrounding surface was apparently healthy. I re-examined the bladder four weeks afterwards; the symptoms had greatly subsided, the hæmorrhagic swelling had disappeared.

Fallacies in the Cystoscopic Diagnosis of Subacute Cystitis with Areas of Extravasation.—Certain forms of instrumentation produce effects very similar to the visual appearances of subacute cystitis with extravasation areas. If a patient who has recently suffered from renal colic be roughly sounded for the stone which is believed to have made the transit of the ureter and to have been trapped in the bladder, blotches of bruising will be visible on cystoscopy. Such blotches are the index of the roughness and ineptitude of the surgeon, but they may mislead the cystoscopist who examines subsequently.

Still more striking are the suction effects of the calculus aspirator on the mucous membrane when that instrument is manipulated by unskilled hands. Should slight pre-existing chronic cystitis have been present, the rough use of the calculus sound and aspirator induces hæmorrhagic blotches and prints which are indistinguishable from those of subacute cystitis. I was asked in 1889 to cystoscope for a calculus which the practitioner felt certain had just entered the bladder from the kidney, but which he could not detect by means of either the sound or aspirator. I demonstrated, diagnosed, and prescribed for the most perfect representation of a subacute cystitis I have ever seen. The extravasations were of a vivid red, and the surface of the bladder was inflamed. I could not explain the renal colic from which the patient had suffered, and I subsequently learnt to my disgust that this symptom continued for a year, and that a stone was passed eventually after an extra sharp attack. I have had considerable opportunities in the last ten years of watching with the cystoscope the effects of the rough usage of the sound

and aspirator on the bladder wall, and the remembrance of my first error, and the lesson it taught me, have often saved me from an incorrect diagnosis.

Circumureteric Extravasation in Blocked Ureteric Stone.

—Akin to the fallacy I have just mentioned, but differing from it in causation and degree, is that dark purple or red patchy discoloration, and extravasation of the circumureteric area and outer limb of the trigone which occurs in cases of sudden plugging of the vesical orifice of the ureter by a spiculated crystalline-surfaced calculus, or even by a mass of blood-clot and necrotic *débris* from the kidney.* This condition can hardly be mistaken for cystitis with hæmorrhagic blotches except by a novice, for the hæmorrhages are strictly localised to the ureteric orifice and its surroundings, and the remainder of the bladder is free. (Compare chapter on Ureter.)

Perhaps the most difficult question to decide is tubercle, but I enter more fully into this difficulty on page 202.

Hæmorrhagic Cystitis.

The cases I have just quoted of subacute cystitis with hæmorrhagic blotches, but with blood-free urine, lead to a consideration of an important and but ill-recognised grade of cystitis, which may for convenience's sake be placed midway between the acute and the chronic grades. I allude to hæmorrhagic cystitis. It is a subacute inflammation of the mucous membrane characterised by symptoms often precisely similar to those evoked by growth in the bladder. It is often most obstinate to cure. It is nearly always of a benign character; in rare instances, however, a certain form of hæmorrhagic cystitis precedes the visible formation of that stunted nodular carcinoma of the mucous membrane which accompanies interstitial malignant growth of the vesical wall. The hæmorrhage may emanate from the entire surface of the

* Cf. 'Path. Trans.,' vol. xvi, p. 178.

bladder, and the inflammation be somewhat acute, or the former may be localised and the latter chronic. The characteristics and cystoscopic appearances of both grades can be exemplified by the following cases :

General hæmorrhagic cystitis; an acute grade; rapid recovery and cure.—Capt. C. T—, æt. 44, came to me in February, 1889, complaining that for a month past he had been troubled with frequency of micturition, which latterly had increased so greatly and the desire had become so imperious that he had been passing water in small quantities every ten minutes night and day. Three days previous to his consulting me he passed bright red blood at the end of the act, and continued to do so every time he made water. Capt. T— made water before me; the urine was quite clear until the end of the stream, when a rush of florid blood appeared. The prostate was not enlarged, nor was there anything abnormal in it to the sense of touch. On proceeding to inject the bladder preparatory to introducing the cystoscope, I found to my surprise that the sphincter could not retain any water, and that it ran out of the bladder as fast as I pumped it in. I therefore placed him under ether, and even then the same difficulty was observed. By grasping the penis I was at last able to keep four ounces of water in the bladder and urethra. No growth could be seen; the entire surface was velvety and dark purple; the ureteric orifices were greatly swollen. He rapidly improved under anodynes, and in two days could hold his water for three hours. The blood entirely disappeared, and he joined his ship in three weeks, to all appearance in perfect bladder health.

[I kept in correspondence with Capt. C. T— until February, 1897 (eight years). He had no return of the hæmorrhage, and though exposed to the vicissitudes of a seaman's life on the African coast he remained in excellent health.]

General hæmorrhagic cystitis; a chronic grade.—Mr. F—, barrister, æt. 59, consulted me in May, 1889, for hæmaturia. His history was as follows :

In March, 1885, lithotomy was performed for a small angular phosphatic calculus. The amount of blood which then appeared in the urine depended upon the amount of exercise taken. Since this operation he has suffered more or less from catarrh of the bladder, which increased greatly in December, 1888. The patient has always had very irritable mucous membranes, his throat and stomach frequently becoming inflamed upon any sudden increase of mental work or worry. In January, 1889, he commenced to pass blood,

and continued to do so without intermission for five months. The urine was of a dark brown colour, the blood being uniformly mixed, the amount of blood being worst at night. He suffered no pain, and only occasional irritability. On examination I found that the prostate was not enlarged, that no residual urine was present, and that the stream was full and forcible, never intermitting. On cystoscopy no tumour or growth was visible; the mucous membrane was swollen and gelatinous in every part, and of a dark, dull purple colour. Evidently the blood was oozing from many points. The injection of water irritated the bladder greatly, and he passed an increased quantity of blood for a few hours after the examination, which excess, however, rapidly subsided. He was placed on a generous diet and sent to the Welsh coast. The hæmaturia ceased.

[I have corresponded with this patient for ten years, until May, 1899, and have seen him several times in this interval of time. The hæmaturia has never returned.]

Localised Chronic Hæmorrhagic Cystitis.—I wish now to draw marked attention to a source of fallacy in localised chronic hæmorrhagic cystitis. In rare cases, perhaps more especially in the female, a chronic cystitis will gradually clear up with the exception of two or three small areas, which may vary from the size of a threepenny piece to that of a split pea. These remain hæmorrhagic, indolently inflamed, and actively irritating to the rest of the bladder. Their appearance reminds me of patches of succulent chronic urethritis. The patches are most often seen towards the right or left side of the base of the bladder, in the ends of the transverse fold which the collapsed superior wall builds with the base in contraction of the viscus. Elevated clumps of deep red, lack-lustre mucous membrane will be seen here, most suggestive of a stunted fibro-papilloma or epithelioma. In the earlier part of my work I have diagnosed such a threepenny-piece sized patch in a female bladder to be a papilloma, and have clipped it out through the dilated urethra. On microscopy it was proved by Mr. Targett to be a piece of chronically inflamed mucous membrane. The patient was cured by the procedure, and I have since wittingly removed similar clumps in other cases as the best method

of curing this chronic condition. I have seen this mistake made by others who claim to be proficient in cystoscopy, and this proves to me that the chance of error is great. In the female no damage is of course done if a mistake is made, for the diseased patches are clipped bodily out with cutting spoon forceps through the dilated urethra, and great benefit results. In the male subject it is otherwise. If the mistake is made in the male, suprapubic cystotomy will be advised, and this is obviously a severe operation for a clump of chronically inflamed mucous membrane. I have not yet fallen into this error in the male subject, but I have known it happen. As an effective substitute I should advise the male patient to be placed in the Trendelenburg position, his bladder having been previously emptied, an urethral cannula should then be passed into the bladder and directed on to the area affected. The surface should be dried under electric light; a tiny swab, already dipped in pure carbolic acid and dried by pressing it into a fold of lint to prevent it slobbering, should be passed along the tube and applied lightly on to the inflamed patch and withdrawn at once. A clean swab is now used to dry the cauterised area, and the tube withdrawn.

As an illustration of the symptoms of these patches of localised hæmorrhagic cystitis I give the following history of the case I diagnosed wrongly:

Dr. Male, of Grays, Essex, sent a lady, æt. 37, to me with a history of intractable and severe chronic cystitis of eighteen months' duration. The patient was cachectic, wasted, and anæmic. The urine that was voided was usually filled with bloody tenacious muco-pus, speckled with scraps of phosphate of lime. The pain and frequency of micturition were considerable. Irrigation and medicines had proved powerless to relieve. Cystoscopy. On the right lateral wall of the bladder, low down, were two sessile "growths" covered with dense muco-pus and phosphates. They were crusted with phosphates. Some areas of the bladder were severely inflamed, others were less. Operation. Dilatation of urethra; two small, monkey-nut, sessile protuberances were clipped off with the cutting

spoon-forceps; they were tough. Mr. Targett reported these masses to be chronically inflamed mucous membrane. The patient made a rapid and complete recovery.

Chronic Cystitis.

The cystoscopic appearances of chronic cystitis depend largely upon the degree of the attendant inflammation. If that be slight, then the mucous membrane is strikingly white and gelatinous looking; its thickness, as measured by the rugæ, is increased. The anastomosing vessels are absent, whilst here and there clumps or streamers of muco-pus are observed attached to the surface. Should, however, a higher grade of inflammatory congestion be present, then the entire surface, but more particularly the base, is swollen, blurred, and of a dull dark red. Muco-pus may be present, but usually in the form of scraps and thin curled-up flakes which adhere to and peel off from the walls. The symptoms of the cases usually correspond to these appearances, the former class exhibiting less irritability and pain than the latter.

Again, the former appearances are more often met with in the less severe forms of urinary obstructive disease, such as slight hypertrophy of the prostate or stricture, in which the irritation of the residual urine, the endo-vesical pressure, and the loss of nerve-force is but slight.

CHAPTER IX.

ULCERATION OF THE BLADDER.

THIS subject may be simply but sufficiently considered under the obvious divisions of—

- A. Simple ulceration { Spontaneous.
Consecutive.
- B. Tuberculous ulceration.
- C. Malignant ulceration.

But before glancing at the clinical aspect of each group in detail, it is advisable, I think, to briefly recapitulate those difficulties and dangers which are commonly encountered in the actual cystoscopy of non-malignant ulceration.

I. Difficulties of Instrumentation in Non-malignant Ulceration of the Bladder.

(a) *Urethral Hyperæsthesia usually necessitates Chloroform.*—The deeper section of the urethra in either sex is distinctly hyperæsthetic in most cases of non-malignant ulceration of the bladder. The prostatic urethra is usually exquisitely sensitive in tuberculous lesions of the bladder. The intensity of the pain is, in fact, pathognomonic of the latter disease. This hyperæsthesia is not due to ulceration of the posterior urethra,* for prostatescopy reveals nothing more than congestion of this part. It is generally advisable to examine under an anæsthetic, for cocaine and eucaine, except in the earlier stages of the

* Tuberculous ulceration of the posterior urethra is, I believe, rare, except in books and on the post-mortem table (that is, in those cases in which the disease has run its course).

disease, are insufficient. It is best to choose chloroform, for with it there is, in my opinion, less chance of inducing subsequent trouble in the kidney, or of producing coughing and bleeding during the examination.

(b) *Difficulty in the Introduction of Flexible Instruments.*—In the tuberculous male patient a decided reflex spasm of the constrictor urethra often closes the membranous urethra to the soft rubber or flexible gum elastic catheters. This may incline the surgeon to the belief that he is dealing with a case of subpubic stricture of the urethra. Let a No. 10 π silver catheter be selected and passed with all possible gentleness, and held, whilst the washing out is proceeding, so that the beak just rests lightly on the trigone.

(c) *Difficulty in obtaining a Clear Medium.*—No bladder needs so much washing and re-washing for accurate cystoscopy as a bladder affected by ulceration. Even after the medium returns apparently clear, the cystoscope will reveal adherent mucus and necrotic shred. Patience must be exercised, and too much, rather than too little, washing should be carried out, but great care has also to be exercised; compare II (a), p. 138.

(d) *Slight Difficulty in differentiating between Ulcer of an Ureteric Orifice and Ulcer near an Ureteric Orifice.*—The cystoscopist must always distinguish between two important ulcers,—between the ulceration of the orifice of the ureter caused by descending ulcerative ureteritis (whether tuberculous or calculous), and the simple solitary ulcer which is commonly seen almost abutting upon this opening; for the treatment of the one is diametrically opposite to the other. The efflux from the ureter is the best guide; and next to it in certainty is the plan of following the interureteric bar, which leads of course to the ureteric orifice. Mistakes are common in operating, even with the bladder exposed to view.

Thus a married lady was brought to me with a diagnosis of an incurable bladder ulcer. The urethra had been dilated a year previously by a very capable surgeon, and

an ulcer had been "detected upon the left base by touch, and scraped by means of the finger-nail." On cystoscopy I saw an open, ulcerated left ureteric orifice, and a fairly healthy bladder. Tubercle was present in the urine. I removed a tuberculous left kidney along with the upper half of its ulcerated and thickened ureter. The bladder ceased at once to cause her pain or annoyance. The tubercle disappeared. She became pregnant, and was eventually delivered of a fine child.

(e) *Slight Difficulty in Gauging Accurately the Progressive Changes in the Ulceration.*—I have been more than once amused by reports in the literature of cases of ulceration of the bladder which have been seen to heal rapidly under this or that form of treatment. Thus, one surgeon reports a case in which a cup-shaped yellow ulcer was seen at the trigone just behind the prostate. After a fortnight of iodoform emulsion this ulcer is described as having healed, and a coloured drawing of it in both stages is appended to the report. It is further stated that in another fortnight the patient left the hospital apparently cured of his bladder trouble. I venture to doubt the accuracy of this statement, and I should hardly allude to it, except that it permits me to introduce and to illustrate the difficulty in gauging the healing or the spread of a tuberculous ulcer.

The size of any object is most difficult to estimate by cystoscopy. The approach to or withdrawal of the prism from an object magnifies or diminishes the size correspondingly. Moreover it is difficult, except to a skilled hand, to so exactly place the prism on two separate and distinct occasions as to view the object selected for examination at the same angle and from the same distance. To a novice due appreciation of size is an impossibility.

But there is a still greater difficulty. It is obvious that the size, shape, and depth of an ulcer depend on whether it is stretched or flaccid, and this must again depend on the amount of water medium used at the examination and the degree of elevation of the pelvis. If

the same amount of medium and the same degree of pelvis elevation is not adhered to on every subsequent examination, the ulcer will vary in size to a remarkable extent. An ulcer viewed in a four-ounce medium is probably one third smaller than that viewed in an eight-ounce medium. Moreover its appearance changes. Let any cystoscopist examine an ulcer in a fully distended bladder by means of an irrigating cystoscope, it will appear as an erosion of a flat surface; let him now gradually draw off water from the bladder, and he cannot fail to notice this shallow ulcer change to a projecting rolled Hunterian chancre-like sore.

Lastly, my experience of ulcers of the bladder teaches me that they heal most slowly; months, not weeks, are necessary for their entire cicatrization. I have known one ulcer to remain unchanged for two years. Fretted by acrid pus, irritated by the soakage of urine of varying specific gravity, disturbed by the constant movements of the bladder, it is indeed surprising that they heal at all.

II. *Dangers of Instrumentation in Non-malignant Ulceration of the Bladder.*

(a) *Danger in the endeavour to introduce a Large Amount of Medium.*—The cystoscopist will remember that the bladder affected by non-malignant ulceration has often a diminished capacity. In the earlier stages its contraction is apparent and not real, for it is merely the muscular intolerance of any over-stretching of the abraded surface, and it is in this respect analogous to the tonic contraction of any sphincter muscles affected by contiguous ulceration (*e. g.* eye, pylorus, anus). But as the ulceration spreads and the muscular layers become more and more exposed and more infiltrated, there is a distinct loss of capacity, due to absolute crippling of the extensibility of the muscular planes; whilst in the third stage, when this intra-muscular exudate has contracted, the bladder is transformed into a small inelastic non-

contractile bag which cannot distend. Hence to follow a routine rule, and to inject a given amount of medium in every case, is unwise, and may be hazardous in ulceration of the bladder.

At first the tuberculous bladder will admit eight or ten ounces, then six, then two and a half or even less.

Now two results ensue if water is forced in beyond the distension limit acquired by any particular ulcerated bladder. At first the edge of the ulceration tears, and a sharp hæmorrhage occurs, so sharp as to render cystoscopy futile. If the distension is persisted in the muscular layers split subperitoneally* and extravasation ensues. Thereupon suppression of urine or suppurative nephritis will terminate the case. Theoretically, even slight lesions induced by over-distension in bladders affected by tuberculosis are fraught with the danger of immediate activity and extension of the disease.

To avoid these dangers, let the cystoscopist ascertain before the anæsthetic is administered how much the patient can pass at one sitting. Let him add to this amount an ounce to represent the residual urine, for all

* The following two deaths, for which I am responsible, are recorded in my work on 'Cardinal Symptoms,' p. 200. I have seen probably about a dozen ruptures of the bladder in fifteen years' hospital practice due to surgical interference.

CASE 1.—W. F—, male, æt. 28; painless, persistent incontinence of urine. I discovered encapsulated stones in the prostate, and performed perineal section. After removing three stones of half an ounce in weight, I washed the prostatic shell with a stream of water, but did not pass any catheter into the bladder. Total suppression of urine came on, and he died the second day after the operation. I found a rupture at the right base passing through the muco-muscular wall, and urine extravasated beneath the peritoneum. The wash water had evidently entered the contracted bladder, and had over-distended it. Left kidney was tuberculous.

CASE 2.—Mary E—, æt. 29. I attempted in the course of two months to dilate a contracted tuberculous bladder, which held half a teaspoonful. When I had caused it to be gradually distended to two ounces, the muscle split at the right base, and an abscess formed at that spot beneath the peritoneum. She died eight weeks afterwards. The right kidney was a mere sac of cheesy material; the left kidney was in a state of acute suppurative nephritis. A three-ounce abscess was found at the right bladder base, deep in the pelvis.

ulcerations of the bladder tend to slight atony. Let this be about the quantity of medium injected and withdrawn in washing. But supposing this little point is overlooked and the patient is already fully under the anæsthetic when the washing is commenced? Let the cystoscopist stop injecting directly the patient moans or flinches or jerks his legs. This he will assuredly do, although deeply anæsthetised, for the bladder reflex in ulceration of that organ is present long after the conjunctival reflex has been abolished.

(b) *Danger in inducing Cysto-pyelo-nephritis by the Washing.**—Lastly, there is in every case of non-malignant ulceration of the bladder a tendency to cystitis after washing. In most cases of vesical tubercle, one or other kidney is coincidentally affected. Hence a danger of ascending septic pyelitis is always incurred in washing out tuberculous bladders in the middle and later stages of the disease. It is wiser at the completion of an examination to throw in a weak solution of nitrate of silver (gr. j in 10 oz.), and after it has been in a couple of minutes to draw it off again. This manœuvre tends to check any infection.

Simple Ulceration of the Bladder.

Our knowledge of the clinical history of non-malignant ulceration of the bladder, other than that due to tuberculosis, is still meagre and inaccurate. Our ignorance is perhaps excusable, for the diagnosis and prognosis of such simple lesions of the mucous membrane in pre-cystoscopic times were beset with difficulties.

In the first place, such cases often drag on for years. They often pass through phases which are characterised by entirely different groups of symptoms. They are not diagnosable except by sight, for the finger of an experienced operator cannot detect an ulcer unless it has

* Examples are adduced in author's 'Cardinal Symptoms of Urinary Disease,' p. 108.

become encrusted with phosphate of lime, or unless it has eaten sufficiently deeply and widely to form an upraised eroded edge.

Hence it was only on post-mortem subjects and rare supra-pubic cases undertaken before 1887 that any definite ulcer of the simple type could be diagnosed. As a consequence of this the treatment was neglected and the prognosis was always grave, for the medical practitioner was haunted by the teaching that chronic ulceration of the bladder was tantamount to tuberculosis, and he anticipated all such vesical trouble to extend eventually to the kidney and lungs and to end fatally.*

Ten years of incessant practice with the cystoscope convinces me that our teaching on vesical ulceration requires modification. I am convinced that a simple spontaneous form of ulceration is met with, which is usually solitary, and which is wrongly diagnosed as tuberculous, and as wrongly considered incurable.

At the same time, I am quite alive to the extreme difficulty of discriminating on visual grounds between a solitary simple chronic ulcer and a solitary chronic tuberculous ulcer. This probably can only be settled by keeping in touch with patients for long periods of time—five to ten years. The subject is a difficult one, and though I have endeavoured to treat it fairly, I feel sure the ten years I have watched such cases is hardly long enough.

Simple vesical ulceration † may be—

Spontaneous, as in the solitary simple ulcer.

Consecutive, as in those following upon cystitis or prostatitis.

* Not long ago I operated on a patient, who for fifteen years had been labelled "ulceration of the bladder." He had taken ten grains of morphia daily to relieve the pain of a huge stone, which occupied me an hour to crush and evacuate.

† There is no advantage to be gained by discussing accidental ulcers, such as those which are due to the "catheter en demeure," or lithotrite or cystoscope. These have no clinical interest, and are evidences of indifferent or rough-handed surgery.

The Solitary Simple Ulcer.

I must acknowledge it came to me as a fresh and interesting fact to discover that the bladder, like the stomach, may become affected by a solitary simple ulcer. The diseases have certain features in common: they may, indeed, be identical in causation. They both occur on the posterior wall* of the viscus, near an orifice. The vesical ulcer on the posterior wall,† near the ureteric orifice; the gastric ulcer near the pylorus (76 per cent.).‡ Both chronic forms are usually solitary—the gastric in 87 per cent. Both may originate in lymphoid nodules. In both the chief symptom is profuse hæmorrhage (75·4 per cent. in the stomach). Both tend to scar, and their cicatrices to warp the normal contour of the viscus. The bladder ulcer is probably, like the duodenal ulcer, more common in man, the gastric in woman.

It must be distinctly understood that the solitary simple vesical ulcer will be rarely encountered.

A well-nourished man, aged twenty, came under my notice in 1888, with intermittent attacks of profuse hæmaturia and constant penile pain. He never had had sexual connection. With the cystoscope I saw on the posterior wall, behind the interureteric bar, a small ulcer the size of a shilling. It had an upraised gelatinous edge and a blood-stained sloughy base. Its aspect reminded me of the scar of a bullet-impaction on a target. I was not allowed to operate, but I have watched the case since. The patient has reported his progress to me every year. During 1894 the symptoms diminished, that is after seven years, and by 1896 they had disappeared.

* It seems far-fetched to mention the posterior wall, but a little consideration will show the reader that much of his life is spent in the supine posture, and that much of the locale of a disease may be determined by the prolonged congestion of sleep posture.

† The bladder, when moderately filled, may be said to have five surfaces: the pubic, posterior or rectal; superior or intestinal; and the two lateral or obturator surfaces (Morris, 'Anatomy,' 1893, p. 1054).

‡ Drs. Samuel and Soltau Fenwick, 'Ulcer of the Stomach,' par. 3, p. 7 *et seq.*

PLATE VIII.

A.



Solitary simple ulcer to the inner side of the orifice
of the right ureter.

B.



The same ulcer healed, showing puckered scale.

I presume the ulcer in this case has healed, but I do not lay any stress upon the surmise, for I have never had another opportunity of using the cystoscope. I merely mention the case as having been the first to come under my notice and draw my attention to the disease.

Since then I have been able to examine and re-examine various patients of both sexes with a similar form of vesical ulcer. I have never met with them in women who have not had children, and the possibility of the pressure and infection due to childbirth renders a diagnosis of spontaneous simple vesical ulceration in women open to question.

Most of my patients with solitary simple ulcer have been young men at or about the age of twenty. I have carefully selected those who have had no venereal history, and I find certain salient features common to all, and these combine to form a clinical picture which I think may be taken as fairly typical of a solitary ulcer of the posterior wall, though it cannot be accepted as diagnostic of that ulcer being simple.

There are two varieties; the chronic ulcer, which is the form usually encountered, and the acute perforating ulcer.

General Characteristics of the Solitary Simple Chronic Ulcer of the Bladder.

There is usually only one ulcer, hence I have called it solitary. Its size rarely exceeds that of a shilling, and its situation is nearly always to the inner side of the ureteric orifice and on a level with that opening (Plate VIII A). It usually affects the tissues of the posterior wall, and does not actually entrench upon the trigone, though its area of surrounding inflammation extends to that structure. Its edges are upraised and a little thickened, its base uneven and sloughy. It is usually shallow, and extends almost to the muscle planes. The muscle bundles are not clearly dissected, as in exfoliating cystitis, but are usually

obscured by necrotic tissue or adherent mucus. I have never had the material for a microscopy through the base.

There is no doubt it is exquisitely tender, for finger pressure from the rectum over its site is hardly tolerable, and the tonic spasm of the vesical and urethral muscles, as evidenced by a diminished capacity of the bladder and deep urethral spasm, are marked features of its presence. It remains in an indolent state for months or years.

Changes in the Ulcer.

(a) *Deposition of Lime Phosphate in the Male.*—Some ulcers, if not all, become coated with a layer of phosphate of lime. This crust accumulates in thickness, is shed periodically, and passed *per urethram*, leading the best of surgeons to suspect the presence of a calculus. Such phosphatic scales are recognisable as ulcer crusts—they are flat, eroded plaques of greyish phosphate of lime, which readily break across. They are also easily distinguished from the thin cup or concave crusts which are formed on lobules of epitheliomatous growth and on renal papillæ, but they cannot be diagnosed from those flat crusts which form on necrotic patches of carcinomatous degeneration, or from those which accompany certain forms of tuberculous ulceration of the renal pelvis. I have had occasion to suspect that these crusts may eventually constitute the nucleus of a phosphatic stone, but this complication is rare.

I have not seen in the male patient those limpet-shaped crusts which I have noticed in the female. Nor have I noticed that they form in the male those secondary contact abrasions and ulcers which I have found in the female. But this may be merely an error of observation.

(b) *Deposition of Phosphate of Lime in the Female; Contact Ulcers.*—In the female bladder there is a tendency to form "contact ulcers." Thus a heaped-up limpet crust

rub the corresponding opposite wall of the viscus, and on the abraded surface thus formed lime phosphate is deposited. This occurred in a few of my cases just behind the pubes. There appears a distinct ledge in this position, which becomes a regular little bed of adherent phosphate (Fig. 58). I used, in demonstrating

FIG. 58.



Vertical section of bladder and uterus. The shaded area on the posterior wall is the original encrusted ulcer, and that on pubic wall of the bladder represents the encrusted "contact" ulcer.

them, to call them stalagmite and stalactite ulcers, in order to impress upon my cystoscopy class the necessity of examining for a pubic wall deposit; for if the floor ulcer only is scraped and the ledge ulcer is left, the case will not improve.

(c) *Tendency towards Tuberculosis.*—It appears to me that there is a distinct tendency towards tuberculous change in these single ulcers. It may be urged that solitary simple ulcer of the bladder does not exist, and that the cases I have watched and even treated are examples of very torpid chronic tuberculosis. Probably some are of this nature, for the only means I have had of differentiating the two classes consisted in the detection of the tubercle bacillus in the urine; and this, even in

well-marked tuberculosis, is sometimes undiscoverable. I have, however, watched cases in which the ulcer has healed without any extension or appearance elsewhere of tuberculous trouble, and of these I have taken a hopeful view, believing them to be "simple." I may add that many of these solitary simple ulcers appear in young people with the facies formerly designated as "strumous," and the cases which turn out to be tuberculous may be infection or implantation of tubercle on a simple ulcer.

(d) *Cicatrization*.—Such ulcers tend to heal without treatment, but the process is very gradual, and I believe it is distinctly retarded by the deposition of phosphate of lime upon the ulcerated surface. At least it has seemed to me, watching cases for years, that those ulcers which are uncoated heal the quicker.

Like any other healing ulcer of an extensile mucous membrane, the vesical ulcer contracts in healing and drags upon the surrounding surface. As the mucous membrane in the bladder is infinitely thinner and more lissom than that of the stomach, the scar puckerings form thick radiating folds (Plate VIII B), which extend from the scar as a centre, and stretch over quite a quarter of the bladder area, warping the contour of that organ and curtailing *at first* its useful extension. These fixed folds may become massy and even keloid in appearance. When examined by the cystoscope in a fully distended bladder they remind one of miniature watersheds, for between each fold there is a shallow depression of the bulged-out healthy mucous membrane. Hence these ridges appear to divide adjacent valleys.

As time goes by, these cords atrophy or are pulled out more and more, and gradually in the progress of years only fine lines remain, which appear taut and white under the pressure of distension.

(e) *Ulceration of the Radiating Rib-like Cicatrices*.—I have never seen the scar of the original ulcer break down, nor have I any evidence that epitheliomatous changes occur

in the scar tissue analogous to that which is observed in cicatrices of the skin; but the thick ribs or folds which radiate from the scar occasionally ulcerate, and if the original scar was covered with phosphate of lime, these secondary ulcers are similarly crusted with the same material. The reverse of this holds true.

Fallacy.—If the cystoscopist operates, as I have often done, and touches a secondary ulcer on one of these rib-folds, he may be almost led to believe he is attacking an epitheliomatous ulcer, so dense and hard is the edge of the ulcer and so cupped and uneven its base.

Ulceration of the rib-folds is very slow in healing.

General Characteristics of the Acute Perforating ? Ulcer of the Bladder.

A single case is a poor reason for suggesting that an acute perforating ulcer may form spontaneously in the bladder, and I should almost avoid doing so for fear of unduly straining the analogy between vesical and gastric ulcers, were it not right, I think, to place a single fact on record, in order to draw attention to the subject.*

A young man æt. 17, without venereal history, was sent to me by Dr. Leggatt, of Norwood, for severe dysuria. The patient had been perfectly well until three weeks before I saw him. He then passed a little blood and was seized with uncontrollable bladder irritation, being forced to pass water every half-hour, day and night. I cystoscoped at once, under anæsthesia, the boy flinching and moaning at three and a half ounces distension. The entire surface was puffed up as if Schleich's submucous injection had been employed—infiltrated by air and water—a condition I had not met with before or since. The left ureteric orifice was a buried slit and the right could not be seen, but suspiciously near its usual site, and in the ordinary solitary ulcer position, was a roundish, ragged hole, the

* I am well aware that the literature contains post-mortem accounts of perforating ulcer; but I am dealing with cases which seem of spontaneous origin.

size of a sixpenny piece. The edges were sharply cut and ulcerated. The hole looked deep, and I thought it was an enormous ureteric orifice at first. At each expiration there blobbed out of the hole scraps of slough and clumps of mucus, only to be sucked in and disappear at each inspiration. I gave no diagnosis, but re-examined in a week. The bladder held more; the hole led into a distinct pouch, out of which, by supra-pubic pressure, I could drive debris, slough, mucus, and water in a rush, but on lifting my hand off the pubic region it was sucked back again; a similar but more placid churning out and in took place as before on respiration.

The orifice of the right ureter lay outside this hole. I now let him come round from the anæsthetic and induced retching. The outrush of muck from the hole obscured the light at once. He lost all his symptoms and left the hospital in a fortnight.

I re-examined a month later in his own urine, which was quite clear. The bladder was healthy in every part. To the inner side of the right ureteric orifice was a dark, finger-tip-sized, black hole. No muck or debris came through it. Rectal examination revealed nothing definite. There was no evidence of tubercle anywhere.

Just criticism might take exception to this, and assert I have been recording a congenital hernia of the mucous membrane. I can only remark that I have been accustomed to examine hernial openings of the mucous membrane, both congenital and acquired, and I have never seen one like this. I believe it to have been the sudden perforation of the muco-muscular coats of the bladder, and as the peritoneal layer is here detached and distant from the bladder a collection of urine formed locally, being prevented from extending along the cellular tissue planes of the pelvis by inflammatory adhesion and condensation set up prior to the giving way of the ulcer.

Symptomatology.

There are certain salient features of the chronic form of the disease which serve to point to ulcer of the mucous membrane, though not to permit of an authoritative diagnosis being made of the *nature* of the ulcer. Most of my patients have been young men about the age of twenty, without any venereal history. The onset was usually

sudden, the initial symptom being a frequency of urination. After a few hours bloody urine has appeared and subsided; a sensation, varying from an itching to a decided pain, was noticed at the penoscrotal bend of the urethra (Fig. 59, P.S.).

The three symptoms increase *pari passu* with the deepening of the ulcer.

The Frequency of Urination.—The frequency, which was at first a marked symptom in the day, appears at night, the patient rising twice or thrice. Cross-examination as to the sleep posture may elicit an important clue, "I cannot lie on my right side," says the patient with a right-sided ulcer, "or I have to get up more often to urinate. I must lie on the left." From this the clinician may gather that an ulcer is on the right side, and that the bladder reflex is unduly irritated by it, for an ulcer is always irritated by superincumbent pressure or by a urine of heavy specific gravity.* The clinician cannot draw any conclusion from this as to the *nature* of the ulcer or as to its exact site, for the orifice of the ureter, if ulcerated, produces this same symptom, which an ulcer placed just beside it does (cf. page 210); but he can infer without fear of mistake that some loss of surface exists on the side the patient cannot sleep upon.

Another very interesting clinical fact lies in the dependence of the frequency upon the pain. If the pain is great the frequency is great, slight pain usually means slight frequency. Control the pain by opium by the mouth, or morphia by the bowel, and the frequency diminishes. Blunting the sensitiveness of the ulcer checks the reflex spasm of the vesical muscles which causes the frequency. Thus one patient whose frequency of urination was every ten minutes, could hold urine three or four hours easily

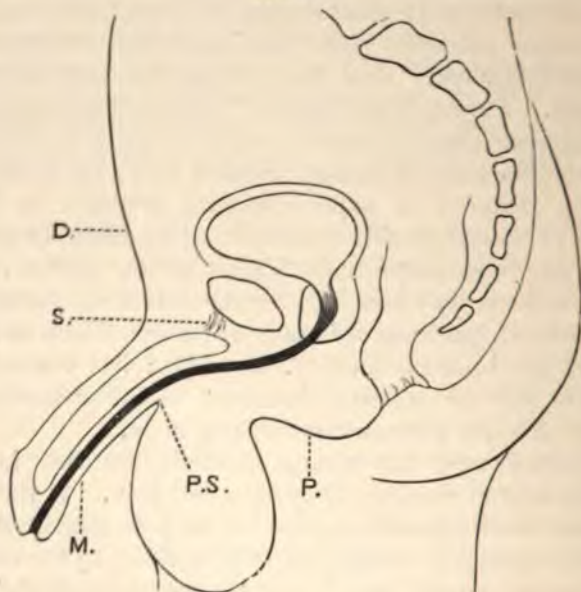
* It has been shown that if the kidneys are secreting urines of different densities (for instance, that eliminated before and after a meal), and if the bladder is kept some hours in absolute rest in one position, that the contained urine will be arranged in strata, the lowest stratum having the highest specific gravity.

if morphia was administered by the bowel. Morphia has not the same effect on inflammatory irritability.

Or, again, by protecting the ulcer from the urine by an application of nitrate of silver, the frequency is diminished. It was almost abolished in one case for twenty-four hours.

The Hæmaturia.—Our text-books assert that ulceration does not produce a violent bleeding like malignant growth. I can only say that I have seen recurrent and

FIG. 59.



profuse hæmaturias of arterial hue in simple ulceration, and in the invasive ulcerations of chronic tuberculosis (page 181); I have even seen some who have suffered from clot retention. When it is remembered that the venous and arterial plexuses around the ureteric orifice are large, and that the vessels enter and leave the bladder in this particular region, the occasional profuseness of the hæmorrhage is not to be wondered at.

Pain.—The situation of the pain, its constant character, and its occasional severity are also worth noting.

There is constant pain in the penile urethra, usually on the under surface at or near the peno-scrotal junction (Fig. 59, r.s.). This is, in some, greatly increased by exercise. One man I watched used to walk about guarding his penis from a jar or jolt by carrying it in his hand, introduced through a slit purposely made in the trouser pocket. Some tread cautiously, as if they had a big stone in their bladder.

Life History of a Solitary Simple Ulcer.

The life history of a solitary simple ulcer may be divided into three stages. The *first*, of variable duration, is before the advent of cystitis; the ulcer may not extend deeply, and it may heal in this stage. Symptoms of frequency, blood, and pain are complained of, but they are not marked.

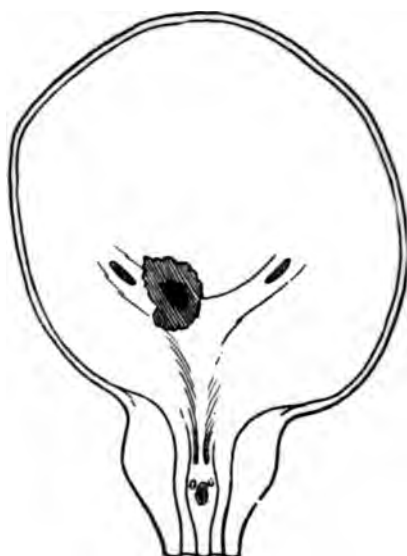
W. B.—(O.P., xvi, 68), æt. 20, without venereal history or sexual intercourse, with no family history of phthisis, was suddenly seized, three months before I saw him, with a burning pain in the urethra at the peno-scrotal bend. The pain was only there during micturition. Fourteen days after onset blood appeared in the urine. Since then bright hæmaturia with clots has occurred once or twice a week. Exercise had no effect on the pain or the blood. There was no marked frequency, for he could hold water for four hours, and rose once at night.

Urine, sp. gr. 1022, acid, with a microscopical amount of pus. No evidence of tuberculous change.

Cystoscopy.—Situated to the inside of the right ureteric orifice, low down on the posterior wall and partly overlaying the trigone (Fig. 60), was a film of greyish-white phosphatic muco-pus. The centre was eroded, forming a superficial, red-edged ulcer. The rest of the mucous membrane was in faultless health, and the capacity of the viscus normal.

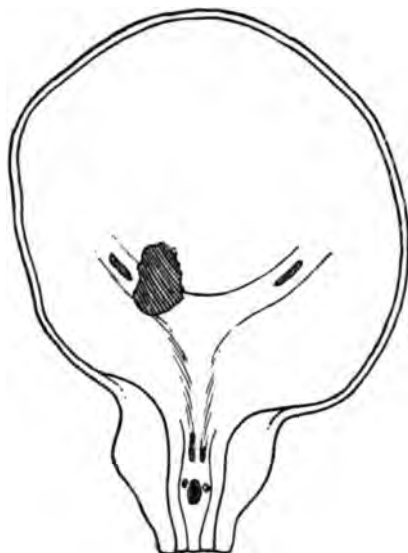
Sequel.—I saw this patient two and a half years later. On cystoscopy I found only a little reddened nipple-like scar where

FIG. 60.



Bladder laid open to show trigone. Shaded area represents ulcer.

FIG. 61.



Bladder laid open to show trigone. Shaded area represents position of ulcer.

the ulcer was, also a little tucking up of the mucous membrane around, extending radially from the scar as a centre.

F. G—, a robust-looking man of 20, without venereal history or family history of phthisis. Two months before seeing me he noticed blood in his urine, and simultaneously he had to pass water once at night.

At the end of six months the bleeding ceased, but glans pain after micturition appeared and vesical irritability increased.

FIG. 62.



Bladder laid open to show trigone. Shaded area represents ulcer.

Urine, sp. gr. 1015, pus one sixteenth, acid. I cystoscoped and saw a small ulcer in the usual area on the posterior wall, low down, near the base of the trigone. No evidence of tubercle anywhere.

I suggested to the medical attendant that the bladder should be washed out with silver nitrate, gr. j ad ʒviij.

I heard nothing of this patient for two years. I was then asked by the medical attendant to re-examine. I learnt the following interesting history. For two years the patient had daily washed out his own bladder with nitrate of silver (gr. $\frac{1}{2}$ ad ʒj, half an ounce of which was always left in the bladder). This relieved him. If he did not wash he used to get terrible pain in the penis and

frequency of micturition. He could not stand up when the pain was present, and much walking increased its severity. Directly he injected the solution the pain left him and he was free from it for twenty-four hours. The ease he obtained was greater if he lay on his back when he injected. He could, by this means, hold water for three hours in the day, and did not rise at night. He could retain fifteen ounces. Prostate and testes normal. Urine 1030. A little pus and bladder epithelium.

Cystoscopy.—Bladder dull but moderately healthy, except at the inner side of the right ureter. Here on the posterior wall, low down, was an ulcer covered with a whitish layer of phosphate of lime and mucus (Fig. 61). Its edge was not blood-stained.

Here is a case illustrating a much deeper sore :

J. W—, æt. 19 (O.P., vol. xiv, 116), without venereal or phthisical history, eight months before coming under my notice, was seized with so violent a pain at the peno-scrotal bend of the urethra, towards the close of an ordinary urination, that he caught hold of the urinal slab to save himself from falling down. This pain eased and left till the next micturition, when it recurred. Somewhat frequent micturition set in at once—four times in the day and once at night.

Fourteen days after, violent supra-pubic spasms. Blood appeared five weeks after the onset symptoms; first little clots, then bright red.

Pain continued in the penis; it was only on micturition, but a supra-pubic ache spread all round the buttocks and sacrum; frequency augmented until it was every half-hour, and three or four times at night. Strains greatly, never satisfied. Urine 1022, acid, trace of pus and albumen.

This was his condition when I saw him in December, 1893.

Cystoscopy.—Ulceration on posterior wall, between ureteric orifices.

Three months later.—Patient was placed on small doses of mercury for a hard chancre of meatus, contracted three weeks previously.

Six months later.—Still pain at the glans penis as he stops at the end of the stream, but is less severe than at first. Urine 1014, trace of albumen; still loses a little blood from the urethra when straining at stool.

Nine months later.—Frequency has disappeared; still pain at end of micturition under surface of glans penis.

Two and a half years after.—Bladder healthy, but at the middle of the wall, two inches from edge of trigone, was a red keloid scar, the ridges of which diverged from the centre like a star. These radiating ribs were continued some distance, fading into sharp thin folds. He held twelve ounces. He is free of all symptoms.

Second stage.—The stage of cystitis. In common with all forms of chronic ulceration or necrosis of the vesical mucous membrane, the "solitary" ulcer shows a marked tendency to become encrusted with phosphate of lime upon the supervention of cystitis. From the date of the commencement of this deposit, the character of the symptoms alters. The phosphatic crust becomes heaped up, often like a limpet shell, which it resembles visually. From time to time pieces break off, and are passed with more or less suffering, or they are retained, and increased in size until they form definite calculi. I crushed one in 1890 nearly an ounce in weight. As the fretted bladder becomes more and more inflamed by the irritation of these rough crusts, so the grade of the cystitis increases in severity. The inflammatory exudation traverses the muscle layers (interstitial cystitis), and at first shackles their free extension. Later on, when the infiltration becomes absorbed or contracted, it reduces the capacity of the viscus to a few ounces. Even in this stage the energetic scraping of each individual ulceration, or wherever there is adherent phosphatic material, and the subsequent daily injection of iodoform emulsion, may cause the surface to heal, and the capacity to improve slightly.

Third stage.—In this stage the mucous membrane has become more or less destroyed. The bladder is a mere inelastic bag, capable of holding an ounce or so. The patient is troubled with extreme frequency of micturition, or suffers from incontinence. Although I have met with such cases, I suspect that this stage is rarely reached, for the ascending pyelitic changes, which affect the ureters and the kidney, generally terminate the sufferings of an untreated patient towards the end of the second stage.

Diagnosis.

As I mentioned before, there are real difficulties to be encountered in the exact diagnosis and prognosis of solitary simple ulcer of the bladder.

Three distinct conditions, all markedly similar in the symptoms they evoke, yet differing widely in the prognosis and treatment, have to be carefully considered.

1. The *solitary* simple ulcer, which appears on the posterior wall to the inner side of the ureteric orifice.

2. The *solitary* chronic tuberculous ulcer appearing in patients of tuberculous diathesis or inheritance, in the same position as the simple ulcer, viz. to the inner side of the ureteric orifice.

3. The *primary diffuse* submucous deposit of tubercle in the bladder, which is not necessarily ulceration, which appears in the lower part of the superior or intestinal wall. This is primary tuberculosis of the bladder.

These three conditions have very similar symptoms at the outset, fine points of difference only being noticeable.

Thus the solitary *simple* ulcer starts usually with peno-scrotal burning, followed by a rush of blood and extreme penile pain—then some frequency.

The solitary *tuberculous* ulcer starts suddenly with frequency and then hæmorrhage, but in many there has been some pre-existing tangible tuberculous deposit,—an epididymal abscess of causeless origin, a knot of deposit of tubercle in the seminal vesicle or prostate, or may be an old tuberculous joint or bone affection.

Diffuse primary vesical tuberculosis, on the other hand, starts suddenly with frequency, not with bleeding. This frequency is accompanied by glans pain. It differs from the two preceding forms in the fact that the hæmorrhages are never profuse in the earlier stages, and rarely so in the later; for it is a disease which never starts primarily as an ulceration, but as a deposit in the submucous tissues, which ulcerates through at a later stage, after which it

extends laterally along the submucous layers, and not deeply at one point.

If, then, we meet with a young adult in whom the initial symptoms were sudden and characterised by repeated causeless sharp hæmaturias, increased frequency of urination, and urethral pain, we have in all probability to deal with a solitary ulcer of the bladder.

Cystoscopy decides at once between the solitary ulcer and diffuse tuberculosis. In the solitary ulcer the sheen of the rest of the bladder is perfect at the outset, and the capacity normal.

In diffuse submucous infiltration of tubercle affecting the bladder primarily, the regions of the ureteric orifices are healthy at the outset, but the superior or intestinal wall is patched with areas of uniform vivid red; the vessels cannot be distinguished in them, and the epithelium can be seen peeling off in small white flakes of necrotic tissue.

But is the ulcer a solitary simple ulcer, or a solitary tuberculous ulcer? I believe it is at first impossible to tell the difference upon mere visual grounds. Other evidence as to its character must be diligently sought for—a small knot in the corresponding seminal vesicle or prostate or epididymis, or the detection of the tubercle bacillus settles the question. If no tangible evidence of tubercle exists, our prognosis is very hopeful.

Differential Diagnosis of Solitary Simple Ulcer and its Mirrors.

	Early stage of		
	Solitary simple ulcer.	Solitary tuberculous ulcer secondary to genital deposit?	Primary tuberculous ulcer of bladder.
<i>Locality</i>	Rare	Not uncommon	Not uncommon.
<i>Age</i>	At or about 25	At or about 30	Earlier, 15—20.
<i>Sex</i>	Male	Usually male	Either.
<i>Usual situation</i>	Inner side of ureteric orifice on the posterior wall	Inner side of ureteric orifice on the posterior wall	Middle of superior or intestinal wall, "back of bladder."
<i>Multiplicity</i>	Single	Single	Multiple.
<i>Size of area affected</i>	Threepenny piece to a shilling	Threepenny piece to a shilling	Small patches.
<i>Tissues involved</i>	Mucous membrane eroded down to muscle layer	Mucous membrane eroded down to muscle	Deposit in sub-mucous layer; mucous membrane vividly infiltrated and peeling.
<i>Symptoms</i>	Pain in peno-scrotal bend; sharp hæmorrhage; frequency increasing by months	Pain in penile urethra; sharp hæmorrhages; frequency increasing by months	Pain at glans after micturition; frequency increasing by days or weeks; a few drops of blood at end of act.
<i>Influence of exercise</i>	Increases pain and frequency	Increases pain and frequency	Does not affect pain and frequency.
<i>Influence of sleep posture</i>	Cannot lie on affected side	Cannot lie on affected side	Posture indifferent.
<i>Other evidences</i>	No evidence of tubercle; no tubercle bacillus	Usually evidence of tubercle in genital tract of same side; tubercle bacillus?	No evidence of tubercle; tubercle bacillus
<i>Course</i>	Very chronic; years; does not extend to kidney	Very chronic; years; extends very slowly to kidney	Passes through stages, two or three years; extends rapidly to kidney and testes.
<i>Prognosis</i>	Good	Fair	Bad.
<i>Treatment</i>	Sandal oil, curettage, maltine, opium	Sandal oil, curettage and excision, Koch's injection?	Sandal oil, non-operative, Koch's injection.

Prognosis.

The prognosis of the solitary simple ulcer in the first stage is very hopeful. Some cases I have recorded have healed during the course of years. The scars have remained firm, and the patients have remained apparently in the best of health. When cystitis has supervened the prognosis must be guarded, for the chance of backward dilatation of the ureter, from *warping of the orifice*, and the ascending waves of inflammatory change which traverse the atonic ureters and gradually cripple the renal tissue, curtails the duration of life, although they may not abruptly terminate it. Much good may still be done in the second and third stage by curettage, and a patient may live for years passing water every half-hour day and night.

Treatment of the Solitary Simple Ulcer.

First stage.—In the cases I quote (page 151), the ulcers have healed either spontaneously or by the aid of injections. I am sure, however, it is unwise to trust to expectant methods. Curettage and excision yield such good results that they should be undertaken as soon as possible. I urge this more especially because of the difficulty of saying whether the solitary ulcer is benign or infected with tuberculosis, and the same treatment is the sound surgery for both classes. The patient can be prepared for the operation by the exhibition of sandal oil or by maltine and opium; but it must be remembered that the patient may consider himself "cured" by these remedies, for relief is usually obtained at once. Even the single irrigation necessary for cystoscopy affords marked relief and deters the patient from accepting operative measures, and valuable time is liable to be thus lost.

Second stage.—I know of no curative medicine when once the ulcer has become encrusted with lime phosphate (second stage), but I have used hexamethylen

tetramine (gr. iv ad Oss) with some success. Vesical washes are better. Lactic acid (from 1 per cent.) or nitrate of silver, or mineral acids are of use, but they are very trying and uncertain. The best way is to thoroughly scrape the surface of the ulcer. In men this may be done through the urethra, by means of an open curettage tube, worked under control of the light, or more roughly through a perineal wound. In women curetting is easy enough. A 28 (Fr. gauge) speculum is introduced in the Trendelenburg position, and the ulcer scraped every other day under electric light, or, better still, the urethra is slightly dilated with a conical dilator, and the *little* finger introduced, and the asepticised finger-nail used as a curette. It is surprising how rapidly cases in the earlier stages improve after this treatment. I have known a fortnight a sufficient time to start a healthy action in an ulcer of months' duration, the patient ultimately getting quite well.

Third stage.—Treatment in this stage is not only disappointing but dangerous. Perineal incision in the male, or urethral dilatation in women, may lead to absolute incontinence, or worse, to fatal pyelo-nephritis. Still, if the patient's life is a burden, and much phosphatic material is collecting, an incision through the perineum in man (never supra-pubically), or the dilatation of the urethra in the female to admit the *little* finger, is the only true surgery which can be suggested. The bladder should be freely scraped with a curette or the asepticised little finger nail, iodoform rubbed in, and *the bladder freely drained* for a fortnight. A daily wash of iodoform, gr. v to the ounce of mucilage water, is valuable.

Criticism.—I repeat most emphatically, that the solitary simple ulcer and the solitary tuberculous ulcer heal under active curettage in the early stages, but the diffuse primary vesical tuberculosis is made infinitely worse by such a procedure. The disease is merely disseminated, and the patient, if of the male sex, is left with a supra-pubic wound which often as not remains unhealed.

I fear surgeons often do more harm than good by interfering with the tuberculous bladder without ascertaining the exact character of the disease they are attacking. I suspect that the very favourable reports which have appeared from time to time in the press, of "cure" of tuberculous ulcer of the bladder after curettage and drainage, have, in some instances at least, been attacks upon the solitary simple ulcer, or the solitary tuberculous ulcer, which so nearly resemble the diffuse form of primary vesical tuberculosis in symptoms, but which differ from it so markedly in prognosis, and should differ in treatment.

Facts demonstrating the close Relationship between some Forms of apparently Solitary Simple Ulcer and Tuberculosis.

Several cases apparently of solitary simple ulcer, which I have watched for long periods, extending over years, have eventually developed tuberculosis in other regions, the original ulcer having healed. This would indicate, in my opinion, either a fault in the original diagnosis, or an ulcer occurring in a patient whose tissues were prone to develop tuberculous processes. I select the two following illustrations.

(a) In March, 1896, I examined a patient sent by Dr. Horace Richardson, with typical symptoms of solitary ulcer, and with a typical sharply-cut solitary ulcer to the inside of the right ureteric orifice. He gradually improved under treatment, and in two years the ulcer had completely healed. But I then detected a small deposit of tubercle, the size of a pea, in the left lobe of the prostate.

(b) I performed perineal section in 1888 upon a man aged 25, and scraped a crateriform ulcer in the left ureteric region, which had been bleeding four years. He recovered, healed completely and remained well, corresponding with me for ten years.

Three years after he writes: "I can feel nothing wrong

unless I get a cold. I work from five o'clock in the morning until nine o'clock at night, and have four miles to walk each way."

Eight years later : hæmoptysis sudden and profuse.

Ten years later : pronounced phthisis.

Eleven years later : died from severe hæmorrhage from the lungs.

Simple Consecutive Ulceration.

This is principally encountered in two forms :

- (a) Simple ulceration consecutive to severe chronic cystitis.
- (b) Simple ulceration consecutive to slight catarrhal prostatitis.

(a) The simple ulceration of the bladder which occurs in the course of a chronic cystitis is not a complication often met with, judging from cystoscopy of that disease, though it is often diagnosed.

In younger patients, especially in women, it is seen mostly on the superior and lateral walls. In older patients of the male sex it is most often found at the base of the bladder, this location being probably determined by the chemical action of the residual urine. Of the latter class I need not speak, except to corroborate cystoscopically the feeling that it often leads to recurrent stone in the bladder. In fact the subject in its entirety would hardly seem to warrant reference, were it not that the condition complicates and renders most obstinate a simple disease ; and were it not that it can only be diagnosed accurately by means of the cystoscope, and only accurately treated under control of the eye.

The erosions are neither large nor deep ; they are generally encrusted by earthy phosphates, the particles of which penetrate into the basal slough and adhere most tenaciously to it. The parts most often affected are the edges of the opening of hernial protrusions (*vide* p. 165), the prominent convexities of the natural

folds of mucous membrane, the solid interureteric bar, and the uvula vesicæ.

Not only do such breaches of surface tend to diminish the capacity of the bladder by actual loss of surface, but they keep it in a perpetual state of reflex spasm; whilst the crusts by actual friction deepen the grade of cystitis and increase the severity of the symptoms.

If then a case of chronic cystitis proves obstinate, especially if spasm pain is suffered from, the cystoscope should be employed; and if a phosphatic-covered patch or an erosion or a definite ulcer be detected, it should be treated topically and energetically.

I have known patients to make no progress for months, but continue to pass the same large amount of muco-pus, and to suffer the same amount of pain at the end of the penis after urination or use of the catheter, and yet when ulceration was detected by the cystoscope and efficiently treated they recovered quickly and completely. The following, which proved the most interesting of any of my male series, is a case in point:

Sugar mould (?) forming on ulcerations of the mucous membrane.—A gentleman, æt. 65, was sent to me by Dr. Mills in October, 1896. He had been under many men in town, and Dr. Marc at Wildungen. He complained bitterly of a frequency of urination, which averaged every hour by day and every half-hour by night, the act being preceded by pain at the bladder neck. He had 10·15 grains of sugar to the ounce in his urine. There was no residuum. The prostate was small for his age, plump, and even-lobed. I treated him for nine months, clearing the water of sugar, but without causing the slightest diminution in the frequency. Finally, I demanded an examination to clear up the reason for this obstinacy. On cystoscopy I was surprised to find small surface ulcerations over the base and postero-superior wall. Some of these erosions were florid and bare, others were covered with a white dense material like mould on jam. Yeast cells were not detected in the urine. Learning that the patient had had syphilis many years ago, I placed him on iodides, and gave him an iodoform bladder-wash. To my surprise his three years' frequency abated, the mould disappeared, the ulcers healed, and in three months he held water for five hours at a time.

Treatment of the Ulceration of Chronic Cystitis.—It will be found that acid washes (lactic, hydrochloric, nitric, acetic), followed by nitrate of silver, and this again by iodoform, will usually clean and heal the ulcerations in the male. If these means prove ineffectual the ulcers should be curetted through an urethral tube, or through a perineal incision. In the female the treatment is easier and more energetic, but even with the natural advantage of an accessible bladder, ulcerations are often very obstinate. Here is a case in point:

A married lady, about the age of 35, came to me with a history of having suffered from severe cystitis for three years. She had worn an urinal, for she was unable to hold water more than half an hour. She had been passing collections of phosphatic material with infinite pain. Her bladder only held an ounce and a half under ether. It was greatly scarred by ulceration; the scar ribs were keloid and ulcerated in parts. On each ulcer was a thin phosphatic crust. I scraped the ulcerations through an open tube and applied iodoform. For weeks no improvement ensued, but the lady and I persisted. Finally I dilated the urethra to the size of my little finger, thoroughly asepticised the nail, and scraped each ulcer. She returned every few weeks; each time the cystoscope enabled me to detect phosphatic encrusted ulcers. Nitrous oxide gas was usually administered, and the ulcers scraped. I cannot say how many times this was done, I believe on fifteen separate occasions; but our joint patience was rewarded, for the bladder healed and gradually recovered its capacity, and in a year she could hold six ounces of water. Improvement went on now uninterruptedly and without any surgical assistance. I watched this lady eight and a half years. Her last report (1900) about her vesical health was, "I am as other women in retaining urine."

I have had other and similar cases, but further illustration is not needed.

The general principles may be summed up. All cases of obstinate cystitis, especially those suffering from spasm or much frequency, should be examined if possible with the cystoscope if no tangible cause for the chronicity (such as stone, tubercle, prostatic carcinoma) can be discovered. If phosphatic covered ulcers are discovered the crusts

must be removed and the ulcers treated topically, or the patient will not be cured. The methods I have found most suitable to effect this object have been already mentioned.

An Especial Fallacy.

There is an especial cystoscopic fallacy to be avoided in the chronic cystitis which occurs in elderly men, or in those who have suffered from obstruction to the urinary outlet. It is remarkable how frequently the dimpling, the depressions, even the small herniæ of the mucous membrane resemble shallow ulcerations. It is not uncommon for the edges of these depressions to be slightly eroded, even ulcerated at one point; and the cystoscopist, seeing an ulcerated edge, jumps to the conclusion that the depression within the ulcerated ring is the base of an ulcer, whereas it is only a depressed circle of mucous membrane badly illumined or half in shadow (Fig. 63).

FIG. 63.



An ulcerated hernial orifice.

(b) Simple ulceration consecutive to prostatitis.

I have already mentioned that the superior or intestinal wall of the bladder may become inflamed from an inflamed

trigone or vesical orifice by direct inoculation, for in the empty bladder this wall falls over and comes into direct apposition with the orifice (p. 124). This inoculation patch usually heals quickly. I have cases in which this highly-placed superior wall patch ulcerated, and as one case which I watched for ten years has a sequel, I give it here in detail.

Prostate inflamed by prostatic seed calculi; ulceration of superior wall by direct inoculation; intervening surface healthy; cure; perineal section ten years after, and removal of many large encapsulated prostatic stones.—F.T.—(O.P., vii, 212), æt. 34, never had gonorrhœa, one brother died of phthisis, married, seen in 1889 with symptoms of prostatic pain in perineum, slight causeless prostatic urethral discharge, great frequency in micturition (every hour in the day). No evidence of tubercle; had passed a phosphatic crust.

Cystoscopy.—On postero-superior wall of bladder are two ulcers, one like a healing vaccine crust, and the other like a true Hunterian chancre, oval in shape, with a raised edge. Orifice of bladder and adjacent trigone deeply inflamed, intervening wall healthy.

Cystoscopy, six months later.—A small, round, upraised, flat-surfaced ulcerated patch, size of a pea, on superior wall. A little to the left side of this is a vivid red fold of pinched-up mucous membrane, evidently a healing ulcer. Entire base still rucked up, reddish and gelatinous; prostate swollen.

Cystoscopy, twelve months later.—Bladder bleached, still one small ulcer, prostate still swollen but less tender; no calculus to be felt in it.

Cystoscopy, two years later.—Healthy.

Six years later.—Healthy.

Ten years later.—Began to pass flat phosphatic stones. Old symptoms recurring, but in addition to these there is difficulty in voiding urine.

Ten years and nine months later.—Examined with cystoscope. High up on superior wall a red patch and a distinct ulcer like a chancreoid, but no stone; but on withdrawing cystoscope I struck a calculus in the prostatic urethra. I could not push this into the bladder, so I did perineal section and found the prostatic tissue packed with eight irregular faceted stones, in addition to the one projecting into the prostatic channel.

CHAPTER X.

TUBERCULOUS ULCERATION OF THE BLADDER.

IN writing this account of ulceration of the bladder due to tuberculosis, I admit at once that some of my statements and opinions are at variance with those currently adopted by the profession. I do not attempt to reconcile the conditions which I have noted, or the facts which I have collected in the cases I have studied, with the accepted teaching, but pursue the plan I am attempting to carry out, of placing on record only that which I have personally observed. At the same time, in justice to the reader, I append some of the opposed dicta in the foot-notes. My remarks are based on 180 cases of genito-urinary tuberculosis, but my statistics refer to the first 157 male cases in my list.

All tuberculosis of the urinary bladder leads sooner or later to ulceration of the surface of the mucous membrane. It is accepted that the bladder may be affected through three* distinct avenues :

- A. Primarily: no other deposit to be found co-existing in the patient.

* It is inadvisable for the sake of clinical succinctness, even were it possible, to add to these divisions that atypical class of infection by tubercle of pre-existing inflammatory changes. I have had a varied experience of these puzzling forms. Thus I have watched tubercle supervene upon ordinary nephritis; upon a simple pyelitis; upon stone in the kidney; upon bruise of the kidney; upon contagion from a psoas abscess; upon the vesical atony of spinal injury; upon the effects of the back pressure of stricture; even upon the inflammatory relics of a gonorrhœa; but such cases follow no fixed laws and have no distinct clinical history.

- b. By extension from a tuberculous focus in the male genital apparatus, or in the kidney or ureter in either sex.*
- c. Secondly, by way of the blood-stream, from some pre-existing focus placed outside the genito-urinary tract.

I submit, and attempt to show, that each of these classes can be recognised cystoscopically when they are in their *earliest* stages; that each has a distinct prognosis of its own; that each has an appropriate treatment, and that if the disease has to be combated with any reasonable hope of cure, each case must be detected *early*, classified rightly, and treated not by any fixed method applicable to all, but on lines which seem most adapted to that particular class.

For instance, if tubercle affects the bladder primarily, the deposit will be found in nearly every case on the superior wall away from the neck. It will be useless to scrape it supra-pubically as is advised, for it is not on the surface, but beneath the mucous membrane. It is not simply localised, but diffused. The best form of treatment, in addition to improved hygiene and proper diet and medicine, is the injection of Koch's new tuberculin.

The consecutive deposit which appears by extension strikes most often into the bladder where the genital and the urinary tracts meet, not at the prostate, as Mr. Morris opines, but at or to the side of the ureteric orifice. It is usually seen first as an ulceration, and it repays operative interference according to its origin and grade of activity.

Tubercle affecting the bladder secondarily does so at any part, even on the anterior wall (Philip), and may appear as a multiple or single deposit. Its prognosis is usually comparatively good, miliary tubercle excepted, for its tendency is to slough out.

Now let us examine these groups more in detail.

* I cannot accept the belief that tubercle is often communicable through coitus by tuberculous vaginal mucus, though this view is supported by such workers as Cohnheim, Verneuil, Fournier, and others.

A. Primary Vesical Tuberculosis.

It is contended that the bladder is never invaded primarily by tuberculosis, but that there is always some pre-existing focus from which it is infected secondarily. Probably there is no structure except the skin and the respiratory tract which can be said to be primarily affected. But this is surely of but little consequence. Tuberculosis does become localised in the genito-urinary system, and often remains for years in the different sections of that tract without affecting other parts of the body. It is much more profitable to determine which part of the tract is most often primarily attacked, and what is the relative tendency of each section to be so invaded. Especially is it important to formulate the exact symptoms which denote the invasion of a primary deposit, for it is very evident that unless the very earliest inroads of the disease are detected and checked, that delayed treatment will prove unavailing against its relentless and destructive progress.

All writers disagree, and must disagree, as to the relative frequency with which each section of the urinary tract is invaded by tuberculosis. Those who see large series of this particular disease are perhaps more reliable guides than those who meet with isolated cases; but even amongst the former great divergencies in opinion are apparent.

Many difficulties and sources of error account for the variety of opinion. Chief among them is the power possessed by the tuberculous kidney to evoke symptoms which throw suspicion upon the bladder—such as penile pain and irritability of the bladder,—and the only means at our disposal of correctly localising the section of the tract primarily invaded is by early use of the cystoscope.

My statistics of the relative frequency of the position of the actual primary invasion are not accurate,* for only

* Author, "The Rectal Contour of a Thousand Prostates," *Brit. Med. Journ.*, p. 395, pl. 1, 1899. If symptoms are to be depended on, and they

certain cases in my series were examined with the cystoscope in their earliest stages. This being acknowledged, I submit that the following statements are worthy of criticism and credence.

Situation of the Primary Vesical Tuberculous Deposit.—

The cystoscopist, if he has opportunities of examining patients in the very earliest stages, will find the usual situation for the primary attack to be on the posterior or the superior (intestinal) wall * (Fig. 64). This is irrespective of sex. I have examined as early as the third or fourth month after the onset of the vesical symptoms, and the disease was even then obvious on the superior wall and microscopy demonstrated the presence of the bacillus later. I eliminate in this statement cases who may have the superior wall affected by contact with the orifice (cf. page 125). I have also watched well-marked instances of the posterior wall deposit, that is of that portion of the wall which lies immediately behind the trigone.

Appearance.—The incursion is never, as far as my experience goes, in the form of miliary tubercle.† I

are not, tubercle first made its appearance in the male cases in the following sites—kidney and ureter, 25 cases = 16·8 per cent.; bladder, 56 cases = 35 per cent.; prostate and epididymis coincidently, 38 cases = 24 per cent.; prostate, 6 cases = 3 per cent.; epididymis, 39 cases = 21 per cent.

* *Statements per contra:*

"The trigonal mucosa is by far the most likely to suffer."—Bryson (Morrow's 'System,' vol. i, pt. ii, p. 864).

"The trigone is usually the starting-point in primary tuberculosis of the bladder."—Senn ('Genito-Urinary Tubercle,' p. 187).

"It is much more likely that the deep urethra is the starting-point."—Morris ('Urinary Organ,' i, p. 391).

"The trigone is the part attacked."—Güterbock ('Die chirurg. Krankheit. der Harnorgane,' p. 395).

† *Statements per contra:*

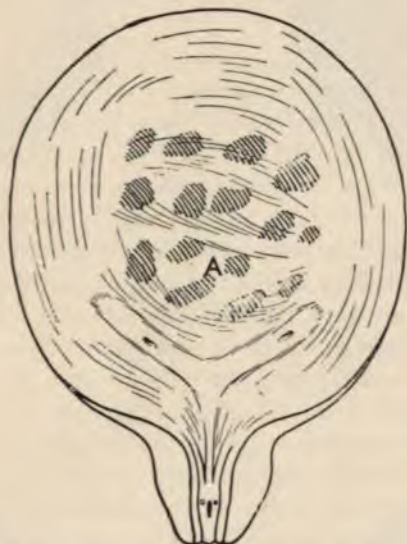
"The initial changes are found to be greyish, miliary tubercles, situated on the superficial layer of the epithelium."—White and Martin ('Genito-Urinary Diseases,' p. 664).

"The process begins with the formation of typical grey nodules in the mucous membrane."—Senn (ibid., p. 187).

"It commences with an irruption of tubercles in the trigonal mucosa."—Bryson (ibid., 864).

have seen fine non-ulcerated grey miliary tubercle scattered over the entire bladder in patients who have died of acute general miliary tuberculosis,* and miliary nodules are often found in the last stages of the disease either

FIG. 64.



Bladder and prostate urethra laid open. The diffuse form of primary vesical tuberculosis appears at shaded areas at A on postero-superior wall.

around or at the bases of extensive ulcerations, but not, I assert, as a primary invasion. The cystoscopist may mistake lymph-nodules or even blocked glands of minute

* One bladder which I presented to the R.C.S. Museum in 1884 (3677A) is an excellent example. I removed it from a patient who died with miliary tuberculosis supervening on diabetes. It is thus described in the catalogue:—A urinary bladder inverted to show mucous membrane, which in parts is thickly studded with miliary tubercles. They are most thickly aggregated around the orifice, and extend in a broad band along the posterior (superior) surface to the apex. The sides of the bladder are comparatively free. There was no ulceration of the mucous membrane. In the recent state the tubercles appeared as grey or pale yellow granulations, slightly raised upon the surface of the pink mucous membrane.

size (*vide* pages 118, 120), but time and care will alter his ultimate conclusions.

The primary deposit is detected on the "back" wall—either on the posterior or the superior (intestinal) wall—in two forms, either diffuse, as a dull red patch or patches (Fig. 64), or localised, as a single ulcer to the inside of the ureteric orifice.

(a) *The Diffuse Form.*—The dull red patches are due to more than a mere congestion, for no vessels are distinguishable. Undoubtedly they betoken extravasation and inflammatory exudation. The deposit may be in the form of a stripe or broad ribbon crossing the surface (Plate IX A), or it may be an irregular patch or patches, the edges fading imperceptibly into the healthy area. The rest of the bladder is healthy; its sheen may be perfect. The surface of each patch is flecked with white. If the prism is edged near to it and these white scraps are magnified, each white fleck will be seen to be a curled white necrotic flake (Plate IX B), partly adherent. The same are seen in the urine of the patient with the naked eye. No tubercle bacillus may be present. The urine in the very earliest days of the disease, apart from the flakes, is comparatively clear of pus, and acid in reaction. The reason for this is the depth at which the tubercle lies. It is not on the surface, but in the depth of the mucous membrane, if not in the submucous layer. For months this remains apparently stationary. Sometimes the patches disappear, but in most instances they are replaced by others in neighbouring parts. I have seen cases where apparently the patch healed and remained quiescent. In course of time the surface becomes necrotic, not *en masse*, but little by little. The submucous deposit softens, the slough escapes and with it the tubercle bacillus (Plate IX c). At any rate when ulceration is marked and the urine remains acid the bacillus is often easily found.

In a patient under my care* who died after an injec-

* Author, 'Path. Trans.' 1891, vol. xlii, p. 189.

PLATE IX.

A.



B.



C.



D.



Grades and forms of vesical tuberculosis.

tion of Koch's original tuberculin of one milligramme, I found a number of small isolated collections of pus in the submucous layer, the epithelial layer being intact. Although at the time I did not fully understand their significance, I have since realised that they were tuberculous foci acted upon by the tuberculin injection and septicity.

I have no evidence that this superior or intestinal deposit is due to an invasion from the peritoneum. Dr. Bryson* has remarked that clinical observation leads him to the opinion that extension to the urogenital tract from the peritoneum is of much more frequent occurrence than is generally believed by surgeons. He says, "The fact that the peritoneal fluid is a medium in which bacilli may multiply; the dependent position of the recto-vesical fold; the ease with which the bacilli can pass through this thin membrane;† its close relationship to the vesiculæ, the vasa deferentia, and the vesico-prostatic venous and lymphatic plexuses, and the well-known relationship between the genito-urinary and peritoneal inflammations, all afford explanation of the clinical observation. The insidious character of tubercular peritonitis, slowly and for a long time advancing, as it often does, without even a fever rise to give warning of its presence, and with little or no pain, taken in connection with the fact that surgeons do not so frequently as they might take into consideration that there is a peritoneal fold (vesico-rectal) within reach of the finger-tip, leads also to the belief that this source of tubercular progress is not so generally recognised as its importance justifies."

I quote this authoritative statement in detail as worthy of attention. I may mention that my own cystoscopic observation of superior wall deposit was made entirely without the knowledge of Dr. Bryson's opinion, and though cystoscopy is greatly in favour of its correctness, yet clinical experience does not, I think, corroborate the

* Bryson, 'Morris's System,' vol. i, pt. ii.

† Is this true?—Author.

peritoneal origin of superior wall deposit. For instance, tuberculous cystitis in the child is an extremely rare disease, although tuberculous peritonitis is common. Nor does post-mortem lend much colour to the theory, for in the tuberculous peritonitis of the adult the bladder is very rarely affected.*

(b) *The Solitary Ulcer*.—I have occasionally met with cases, apparently of primary vesical tuberculosis, in which a solitary ulcer was seen to the inner side of the ureteric orifice. I could not distinguish its appearance from the solitary simple ulcer (*vide* p. 142).

Progress of a Primary Tuberculous Deposit in the Bladder.

Once the postero-superior wall deposit starts to break down into ulceration the process continues more or less uniformly, and it does not, of course, differ in the smallest detail, visual or clinical, from any other forms of vesical tuberculosis.

Little by little the mucous membrane is undermined, inflamed, and cast off, until only the trigone is left; and this, I believe, is never removed. Its edges may be undermined, and it may even be detached about its middle, but the fixed points at the ureteric orifices and uvula vesicæ still remain (compare p. 113). One of the ureteric orifices is attacked before the other; both are never attacked equally. The orifice of that ureter on which the stress of the disease first falls changes in contour, its lips thicken, and it becomes caked and patulous. The same changes will be found in the corresponding renal pelvis; it becomes dilated, atonic, and thickened.

* In the post-mortem records of the London hospital there are forty-seven cases recorded of peritonitis attended with tubercle of persons above fourteen years of age. In only five of these were the kidneys stated to have contained tubercle, and in only two is the bladder described as being affected (in one it was "ulcerated," and in another "tubercular").—Dr. Samuel Fenwick, 'Obscure Diseases of the Abdomen,' p. 159.

If a post-mortem is obtained at this period crude tubercle or ulceration may be found occupying one or two of the papillæ in the lower calyces, or the lower third of the kidney may be more or less affected (Fig. 66). As time goes on the entire gland perishes from below upwards. If the patient lives, the other ureteric orifice widens, its lips swell, but they do not cake nor open widely. Corresponding to this pouting enlargement of the orifice is enlargement of the renal pelvis, and increase in the size of the kidney.

Symptomatology of the Earliest Stage of Primary Vesical Tuberculosis.

There are two symptoms which invariably mark the onset of primary vesical tuberculosis—irritability of bladder, and pain at or towards the glans penis after urination. In the female there is usually supra-pubic pain if the water is over-held, and meatal pain after the act.

It will be noticed that I do not include blood among the initial symptoms. Often as not it is absent, or it may come on weeks after the onset, and then only in the form of a few drops at the close of urination. But this symptom appears to depend more on the acuteness of the invasion than upon the actual site.

The Intermittency of the Symptoms—the Latency of the Disease.—One of the striking features of the disease in its earlier stages is the occasional cessation of all symptoms. The patient appears well and feels well. I cannot understand these lucid intervals. If the patient has been taking sandal the reduction of the co-existing cystitis is quite sufficient to account for the amelioration, but it is otherwise when no medicine is being exhibited. It is as if the tuberculous process periodically exhausted itself in the production of irritating substances (ptomaines?), although tubercle bacilli may be still found in the urine. If we examine cystoscopically we often find the disease

apparently quite active, although the patient is without symptoms; in other words, the tuberculous process is progressing insidiously and latently.

F—, æt. 26 (a patient of the late Dr. Lockett's), had marked symptoms of primary vesical tuberculosis.

Cystoscopy May, 1899.—Obvious postero-superior wall infiltration in patches; both ureteric regions, the left especially, were involved. "Many tubercle bacilli in urine" (C. R. A.). I lost sight of case. He returned to observation ten months later at my request. He stated himself to be "cured." There was an entire absence of pain, and the frequency was not marked.

Cystoscopy February 3rd, 1900.—Bladder held ten ounces easily. The trigone was free, but its superior edge and the adjoining part of posterior wall were splashed with extravasations, and ulcerated superficially. The right ureteric orifice was slightly patulous, and seemed a little displaced. The superior wall was sheeny. Tubercle bacilli in urine (C. R. A.).

H—, æt. 33, sent by Dr. Wreford with extreme frequency (twenty times a day). Great pain and blood. In a month he declared himself free of symptoms, but on being examined cystoscopically, small ulcerations were visible on the posterior wall just behind the trigone, and the surrounding area was splashed with extravasations, and yet the urine was quite clear, and the patient was almost free of symptoms.

Types of the Superior (Intestinal) Wall Primary Deposit of Tubercle.

J. B—, æt. 18 (Dr. Cotman's case). One sister and a maternal uncle died of phthisis. Onset symptoms: frequency of micturition, pain at glans after urination. These symptoms continued, and increased in severity.

Three months after.—Urine 1012, faintly acid, clear, trace of albumen; one or two pus-cells only. Tubercle bacilli in small numbers. No tactile evidence of tuberculosis. Frequency, every two hours in the day and twice at night. Sandal exhibited, frequency declined to three hours.

Cystoscopy five months after onset. Superior wall patched with extravasation.

F. E. G—, æt. 18. No phthisis in family. Onset symptoms: frequency of micturition, then sudden pain in glans penis after act. The frequency and the pain continued intermittently—perhaps patient having a week's freedom from it at a time.

After six months, frequency every two hours in day, not at night; never blood. Urine 1024, clear.

Cystoscopy.—On right side of superior wall was a large red infiltrated patch.

After eighteen months.—Urine 1022, murky; contains tubercle bacilli. A deep red patch over superior wall, and in the centre a visible ulcer. Frequency, every four hours and not at night. No tubercle bacilli in urine. Sandal oil was useless.

Mary A—, æt. 17. Sent by Dr. Steel of Hemel Hempstead. Onset symptom, a slight daily frequency, which continued and quickly increased.

After two months, supra-pubic pain before micturition, relieved by act.

After three months, a little blood at end of urination.

After six months, frequency at night.

After twelve months, frequency every hour in the day, thirteen times at night. More pain lately, supra-pubically, better after micturition, also a needle-like pain at meatus after the act. Urine smoky, 1012, albumen, urates.

Cystoscopy.—Before sandal oil. Bladder greatly swollen and inflamed, mucous membrane ulcerated and gelatinous (quilted).

Cystoscopy.—After six days of sandal oil. On postero-superior wall I saw a yellowish, sloughy, deep ulcer, with sharp-cut edges like a bullet impaction, blood-red. Mucous membrane below and to the left hæmorrhagic. Patches of this wall are healthy and shining. The quilting and swelling seen several days ago are gone. Base mulberry red, $4\frac{1}{2}$ oz. distension.

Cystoscopy.—After fourteen days of sandal oil. Left-sided congestion patch gone. The ulcer seems smaller (? difference in distension), anyway less of it is visible, but the deep red zone of blurred extravasation is the same.

Base less mulberry in colour, 4 oz. distension.

Cystoscopy.—After twenty-one days of sandal oil. Character changed. An extended ribbon of dull red, patched with white necrotic pieces, crosses the superior wall. Lower down and on the right is a syphilitic-looking ulcer. Its edge is upraised; not much congestion around it. 4 oz. distension. Note the patient is not so well; but then she is expecting her period in two days, and she is "always worse just before."

Cystoscopy.—After twenty-eight days. Blood-red wheal across bladder back is broader—the surface is peeling—ulcer the same.

Koch's original tuberculin was now used, and in two days her overdue period appeared. Her control was greater, being four times in the day, and pain was easier.

Cystoscopy.— $4\frac{1}{2}$ oz. distension.

The broad vibices across bladder back had disappeared. There were now three isolated patches of disease on postero-superior wall. The highest placed patch was covered with clear mucoid vesicles, and looked in shape like a pale mulberry. The ulcer was also changed in appearance; its edges were much thicker, with healing rim; it had now the aspect of a chronic ulcer of the leg.

Patient now improved, holding her water four hours in the day and rising once at night.

I heard subsequently that the improvement was not maintained.

Example of Posterior Wall Primary Deposit of the Solitary Type.

G—(O. P., xvi, 68), æt. 20. No venereal or phthisical history. Suddenly developed a burning pain upon micturition in the penoscrotal angle of penis, and passed blood a fortnight later. The blood recurred once a month; it was mixed with the urine or passed pure at the end of act; it was not profuse. Exercise had no influence on it. There was no arrest of stream. He rose once at night, and held water four hours in the day.

Four months after onset.—Tubercle bacilli in urine (?). Cystoscopy. Bladder capacious: mucous membrane healthy except to the inside of the right ureteric orifice: at this spot was a small red-edged superficial ulcer.

Two years later in perfect health. Ulcer healed. Mucous membrane scarred and ribbed at site. A deposit of tubercle in the prostate.

Treatment of Primary Vesical Tuberculosis.

The treatment of primary vesical tuberculosis, in my opinion, is governed absolutely by the character of the invasion as seen by the cystoscope. But in every case sandal oil should be administered, to reduce inflammatory swelling, for about fourteen days. Then hexamethylen tetramine gr. v in a half-pint of boiled hot water should

be given three times a day, in order to render the urine acid and as aseptic as possible.

The next step in the treatment depends on the character of the invasion, whether it is diffuse or localised, and here I would condemn most warmly the routine employment of the curette or of drainage.

I do not hesitate to say that the supra-pubic operation, as advised by some, regardless of the character of the disease, is rude surgery. The curette can only be of service when the surface is ulcerated, and in many cases the deposit lies under the surface. Well-meant but ill-directed scrapes with a sharp curette at "something red or something raw" cannot but open up healthy tissue and spread the disease. I sometimes am inclined to believe the operator himself does not know how little or how much he is doing if he works without the aid of a head-lamp. I watched one surgeon, whose tactile manipulation I admire, perform supra-pubic cystotomy, demonstrate "tuberculous ulceration," scrape it very neatly; but on post-mortem—for the man died ten days later of septic pyelo-nephritis—I satisfied myself there was no lesion of the mucous membrane of the bladder, either made by tubercle or by the operator.

The Diffuse Form (p. 172).—If the disease be seen in the form of diffuse infiltration of the posterior wall or postero-superior wall, no cutting operation should be carried out. I am sure it is better to inject Koch's new tuberculin, commencing with $\frac{1}{250}$ mg., giving the patient a course of six injections of increasing strengths ($\frac{1}{250}$, $\frac{1}{200}$, $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{50}$ to 1 mg.) with a Lürer syringe. It is surprising, if the disease is recognised *early*, and treated in this way, how improved the patients are by this means.

Case.—Mrs. W—, æt. 32, was brought to me in January, 1898, by Dr. John White, of Nailsea, with the diagnosis of cysto-pyelitis. There was much frequency, much straining and rectal pain, and the pus in the urine remained unaffected by vesical irrigation.

Cystoscopy.—There were patches over the postero-superior wall

very suggestive of tuberculosis, and a distinct loss of surface epithelium low down near the edge of the trigone. The right ureteric orifice was somewhat patulous and round, but not caked; the left was in a normal state. Tubercle bacilli were found in fair numbers (C. R. A.). I gave her six injections of Koch's new tuberculin, beginning with $\frac{1}{100}$ mg. After two injections, $\frac{1}{100}$, $\frac{1}{100}$, the urine was clearer, the pus less. There were no bacilli (C. R. A.). She could hold water for two hours in the day, and rose twice at night instead of five times. After the third injection, $\frac{1}{100}$, sudden pain was felt in the right kidney, and pyelitis appeared. This subsided quickly, and she finally left for home much improved. No tubercle could be found in the urine, nor were they again discovered (watched for two years). The injections were continued by Dr. John White. She put on weight, felt stronger, and the urine became clear and free from bacilli.

Cystoscopy after fourteen months (March, 1899).—Her urine was utilised as medium. "I am astonished to see the bladder so healthy. There is a single red patch pinched up on the posterior wall low down, it looks like the final stage of a small ulcer; pain is still complained of if the urine is held more than two and a half hours. There are no bacilli."

Cystoscopy after two years (March, 1900).—"Bladder perfect. No sign of extravasation. The posterior wall is covered with long fine white scars in the shape of ridges of mucous membrane, which cross transversely and interlace about the middle. The right ureteric orifice is pulled out slightly, the left orifice is a mere sharp slit."

"Patient held water seven hours yesterday, and rose once at night. She is without urinary pain, but lately she has cut the fat off her food, rejected butter, and complained of pain across her back. She has lost weight."

Treatment of the Solitary Tuberculous Ulcer (p. 174).—I have mentioned that I have occasionally seen a solitary tuberculous ulcer, apparently the sole expression of primary vesical tuberculosis. If the urine contains tubercle bacillus I urge that Koch's new tuberculin should be used, and the ulcer examined after a course of six injections ($\frac{1}{100}$ mg. to 1 mg.), the same pelvic elevation, the same amount of medium, and the same cystoscope being used on both occasions. If the ulcer shows signs of healing it is better to wait a while, if possible, to give change of air, and then to re-examine in a few weeks. If, however, the ulcer remains obstinate, it is, I believe,

wiser to do supra-pubic cystotomy in the male or urethral dilatation in the female, to pass a caisson on to the ulcer, to thoroughly scrape it and to stamp iodoform into it, just as one would excavate and fill a carious tooth.

Note on the Use of the Caisson or a Small Speculum in Supra-pubic Cystotomy for Vesical Tuberculosis.*—The bladder in this, as in all other cutting operations for vesical tuberculosis, should be first washed out thoroughly with boracic water (4 per cent.) and then distended adequately with silver nitrate solution (gr. j ad Oj). The supra-pubic incision into the bladder should just permit the forefinger to enter the viscus and plug the opening, while the silver nitrate solution is run off through the catheter. When the bladder is empty, the hook retractor is insinuated into the bladder by the side of the finger, lifted up and steadied; while the small caisson (forefinger-sized or larger) is slipped in and dropped on to the ulcer. The head-lamp is now directed on to the caisson mouth, the ulcer localised, dried, and scraped; the tissue débris is taken up through the caisson by means of lint swabs, so that no tuberculous material touches the supra-pubic wound. When all that is necessary is finished, the drainage-tubes are slipped into the bladder through the caisson and the latter drawn over them.

B. Tuberculosis invading the Bladder from a Tuberculous Source in the Male Genital Apparatus.

Cystoscopically there is, I submit, a marked difference between the very earliest appearances of an actual deposit of tubercle primarily deposited in the bladder, and those which mark the advanced guard of an aggressive invasion from an extra-vesical source.

There appears also to be a corresponding difference between the symptoms evoked by these two varieties of tuber-

* Author, "The Use of the Caisson in Bladder Surgery, especially in Supra-pubic Cystotomy," 'Brit. Med. Journ.,' 1892, Nov. 19th, p. 111.

culous deposit. I propose briefly to glance at tuberculous invasion of the bladder from (1) the epididymis, (2) the prostate and the vesiculæ seminales, (3) the kidney.

(1) *Invasion of the Bladder from the Epididymis.*

Let the clinician watch the case of a young man in whom one epididymis has suddenly and spontaneously become inflamed (torpidly or acutely), but in whom there is no tactile evidence of tubercle in the prostate or seminal vesicles. Let it be a young man who has never had sexual intercourse (to eliminate venereal disease), whose lungs are free, who has had no evidence of tubercle in bone, joint, or skin. Let him follow the course of that case for ten or fifteen years. Three facts will force themselves upon his notice.

First. He will remark the long latency of epididymal tubercle, no matter whether the deposit has suppurated and become septic or has remained indolent, no matter whether the testicle has been left alone or ablated. He may watch the patient four years, seven years, or even fifteen years, and yet may observe no symptoms of the invasion of the urinary mucous membrane occur.

Secondly. After a variable number of years, when the patient is in his thirtieth or fortieth year, the clinician may notice a sudden and painless hæmaturia supervene; or a profuse hæmorrhage may be heralded by a few days' irritability of bladder. This initial attack of bleeding will subside in about three days, but only to recur, each succeeding bleeding being more profuse, until, perhaps, clot retention supervenes. The observer will be struck by the profuseness of the hæmorrhage. He may recall the dictum "that in tuberculosis of the bladder hæmorrhage is insignificant,"* and thereupon exclude this disease from consideration in his diagnosis.

* H. Morris says: "As an early symptom the hæmaturia is spontaneous and slight, the urine being faintly pink or rose tinted throughout, but there may be a few drops of pure blood at the end of micturition. As it comes so it goes, without obvious cause, and is thus unlike the hæmaturia of calculus,

Thirdly. He may notice that with the hæmorrhage is a constant burning in the penile urethra, and with it marked irritability of the bladder, or instead of these symptoms he may note the appearance of severe pain in the kidney on the same side as the old testicular abscess.

Lastly. He may remark the age of the patient as being between thirty and forty—a decade in which urinary tubercle is not commonly encountered.

If now the clinician will further take a series of such epididymal cases—rigidly excluding from them all gonorrhœal infections, all obvious tuberculous lesions of skin, bone, joint, etc.—he will note how frequently these severe hæmorrhages occur in the urinary tuberculosis of mid-adult life.

Life-history of the Invasion of the Urinary Tract by a Primary Epididymal Tuberculous Deposit.

The testicle of a boy or a young man swells suddenly and causelessly or in consequence of a slight blow. It may not, it generally does not, cause much pain. Frequently the epididymis suppurates; the abscess breaks or is opened, leaving a sinus; or the testis is ablated. Years pass by, the man being in perfect health. One year, four years, seven years, eleven years, sixteen years but, in this respect, similar to the hæmaturia of tumour. There is this difference, however, the bleeding of tumours is free and abundant, whereas the hæmaturia of tuberculosis is slight."—Morris, 'Genito-Urinary Disease,' p. 393.

White says: "Hæmaturia in many cases is an early symptom. The bleeding is slight, spontaneous and sometimes terminal, a few drops of pure blood following the claret-coloured urine. It often stops as suddenly and as inexplicably as it begins, and may not reappear for days or weeks. This symptom becomes gradually less prominent as the disease progresses. Exceptionally there is a profuse hæmorrhage, but where this occurs the presence of vesical tumour should be suspected."

Senn says: "The hæmaturia is never as profuse as in tumour of the bladder, and usually it is not constant."—Seun, 'Genito-Urinary Tuberculosis,' p. 196.

Güterbock says: "Es sind diese sogenannte 'kleine' Blutungen (Stapper) seltener werden sie beträchtlicher."—Güterbock, p. 397.

may elapse and no symptoms appear. Then one of two sets of symptoms will supervene, the more common being referred to the bladder, 75 per cent.; the less common to the kidney, 25 per cent.

Initial Symptoms referred to the Bladder.—If the bladder is the first to show invasion it will be marked by symptoms of slight frequency and scalding, followed sooner or later by a rush of blood in the urine. In fact, a profuse hæmorrhage may be the first symptom, and the practitioner be summoned to relieve a clot retention.

The blood lost during an attack is hardly credible; some speak of a gallon of blood and water, others a quart, a pint, two chamberfuls. I have seen almost a pure stream of scarlet blood passed. These attacks rarely last more than three days. The pain is either penile or perineal, and is of a constant burning character.

If the kidney shows signs of invasion, the symptom is either that of severe renal pain, or a severe hæmorrhage followed by pain in the kidney. Whether the pain is referred to the urethra or the kidney, it is relieved—as in the hæmaturia of growth—by the hæmorrhage.

Cystoscopy.—If we were able to cystoscope the patient directly the symptoms of irritability and scalding ensued, one would see the exact condition of the mucous membrane over the deposit of tuberculous material; but patients are rarely brought before the profuse hæmorrhage has drawn attention to the seriousness of the trouble. My own belief is that the vesical irritability and urethral scalding mark the gradual encroachment upon the mucous membrane of the tuberculous invasion; that these symptoms and even a sharp initial hæmorrhage do not necessarily indicate ulceration, but extravasation from the vessels of a patch of infiltrated mucous membrane stretched over a small mound of tuberculous deposit.

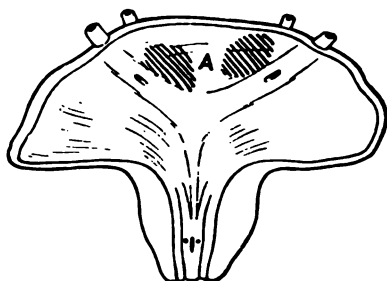
Examples.—H—(P. P., 26, 65). Both testes struck and abscessed. Eleven years later he had a cutting pain along the urethra on urination; then a trace of blood appeared at the end of the act, then

free hæmorrhage and clots. Frequency every two hours in the day and twice at night. A deposit is felt in the left lobe of prostate near vesiculæ seminales.

Cystoscopy.—Bladder uniformly red and swollen and light absorbing. No active ulceration, but a deeply injected, upraised mulberry patch on trigone.

I have not had cases sufficiently early to see the mulberry patch at the usual position in which invasion most frequently appears, that is, to the inner side of the ureteric orifice (Fig. 65, A); but I have watched them after the mucous membrane has given way in this position. Usually the ulcer thus formed is single, the surrounding

FIG. 65.



Base of bladder showing openings of the ureters and lines of *vasa deferentia*. A. Shaded area representing the site where the invasion from the testicle or kidney is first seen in the bladder.

area being of a dull brick red. The edges are sloughy, and frequently show swollen glands either singly or in bunches. These glands are clear, and resemble miniature grapes (Plate IX D).

G—(O. P., xvii, 240), æt. 32. At the age of twelve the right testis swelled spontaneously to the size of an "ostrich egg." This gradually subsided.

Nine years later he noticed a slight frequency in the day (two hours).

Thirteen years later fleshy pieces, about half an inch long, appeared in the urine on and off; ? clot.

Fifteen years later a severe hæmorrhage occurred which lasted two days. This loss of blood recurred at intervals of every six months, becoming more and more severe each time, clots accom-

panying the attacks. Potash always checked the loss. He suffered pain, also of a perineal type, which was so localised that he could cover it with the tip of one finger. This pain was increased on micturition, relieved by rest or by pressure.

When I saw him, twenty years after the testicle had swelled, he was passing water every hour in the day and four times at night; urine 1020, acid, *clear*; albumen and tubercle bacilli were present in it. He had constant perineal pain, and was occasionally passing scarlet urine and clots. The right testis was small and fibrous, the left testis large and healthy. Prostate was atrophic. There was no renal tumour.

Cystoscopy.—On the right superior wall above the right ureteric orifice was a punched-out ulcer, with adherent white slough; the surface around was intensely red.

H. W.—(P. P., 9, 36), æt. 16. At the age of twelve the left testis swelled spontaneously and broke.

Four years later frequent urination in the day commenced, and supra-pubic pain on over-holding urine. Frequency was then noticed at night, and in seven days a rush of blood appeared in the urine. Prostate healthy but hard.

Cystoscopy.—On the posterior wall, to the inside of the left ureteric orifice, I saw a distinct pinching up of extravasated mucous membrane, and covering its edge were a row of grape-like glands. This condition stretched across the posterior wall, and a similar condition was seen on the right side. The base was healthy. I have watched this case nine years. The patient is now six feet two inches, splendidly proportioned, but the right seminal vesicle has ulcerated into the rectum, and some urine passes into that canal. He has had many severe hæmorrhages from the bladder.

M—(P. P., 32, 70). Left testis suppurated, and it was ablated.

Twelve and a half years later frequency of urination and a little blood. No deposit in prostate. All these symptoms have increased greatly during the last few weeks.

Cystoscopy.—Bladder contracted, patches of vivid red in posterior wall on left side; near, but behind, left ureteric orifice were a number of small, punched-out ulcers.

It is, I believe, exceptional for the initial symptoms of invasion from the epididymis to be produced by a trigonal deposit, that is to say by a prostatic deposit penetrating the trigonal area. In one case in which it occurred

the prostatic deposit was distinctly congested if not inflamed.

S. A—, æt. 20. Never venereal. Father has had hæmoptysis; maternal aunt was phthisical. Patient first came under my notice December, 1891, with retention due to blood-clot, his bladder being distended as high as the umbilicus. His history was as follows:

Three years ago the left testis swelled. Two and a half years later he suddenly passed a quantity of bloody urine. There was no frequency and no pain. Two months later he was seized with retention due to clot, which he finally overcame by violent straining efforts, passing a quantity of clot and blood. A burning pain at once commenced in the urethra from the peno-scrotal bend to the glans, and this has continued. It was worse after urination, sometimes fairly doubling him up. No frequency of urination.

I saw him in his third attack of hæmorrhage. The left epididymis and left lobe of prostate had each a knot of tubercle in them. The right has a monkey-nut sized deposit of tubercle. No lumbar pain. Urine 1024, alkaline, some pus.

Cystoscopy.—Both ureters pumped healthy urine. The opening of the right was pouting with inflammatory exudation, which had spread to it from the right lobe of the prostate. It seemed to be very active in its efflux.

On the right side of the trigone was a distinct upheaval, in shape like a small mulberry-coloured growth. Adjacent area of right ureteric orifice deeply blood-stained.

Four and a half years later (July, 1896).—This patient came again. He had remained well until three days ago, when he had another attack of hæmorrhage. No cystoscopy.

Eight years later (February, 1900).—No pain anywhere; patient in perfect health; can sleep on either side; has put on a stone in weight; deposit in left epididymis has lessened. I could not now say that the prostate has ever had a deposit in its left lobe. It is certainly firmer than usual.

Cystoscopy.—Bladder in perfect health. Both ureters, especially the left, are slightly half-mooned. No evidence of disease.

Initial Symptoms of the Invasion of a Primary Epididymal Tuberculosis referred to the Kidney.—The kidney, judging from the clinical and operative evidence at my disposal, is affected transiently or permanently by the gradual extension of tubercle towards the urinary tract from a primary epididymal focus.

Transient Kidney Symptoms.—It has appeared to me that the swelling consequent upon the necrosis and ulceration of a vesical deposit placed just by the side of the ureteric orifice should partially occlude the channel of the ureter, and produce those symptoms of renal pain which are occasionally noticed in these cases, and often arouse suspicion of renal tuberculosis. Under these conditions the renal pain is transient, for the ureteric orifice accommodates itself, and it is only when ascending tuberculosis or septo-tuberculous changes attack the kidney that constant wearing pain is complained of.

Case.—J. S—, æt. 30. Paternal grandfather and one sister died of phthisis. No venereal. At age of seventeen the right testis began to swell; it was ablated.

Twelve months later the left testis began to swell.

Eleven years later, after urination, he suddenly felt a sharp pain at the suspensory ligament of penis. This remained for a week after each urination. Slight frequency set in. Water quite clear. This subsided, and he married six months later. Coition painless.

Eighteen months after the first attack of pain at the suspensory ligament he was seized again with a similar pain and commenced to pass blood, the bladder being irritable. These attacks of hæmorrhage recurred; each attack became more violent than that preceding it. Between them he is well, except for a frequency of two and a half hours in the day, and a right loin pain. This is a dead, fixed pain; it commenced subsequent to the hæmorrhage. Knot of tubercle in right lobe of prostate.

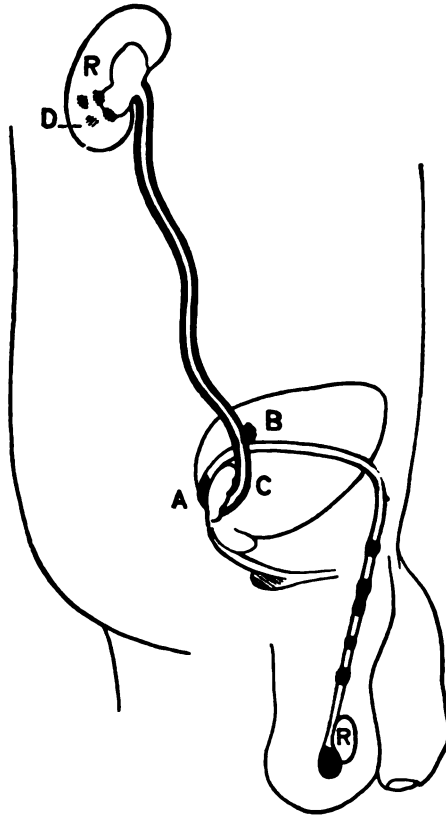
Cystoscopy.—Bladder held thirteen and a half ounces easily. Postero-superior wall of bladder healthy, white, and shining. Left ureteric opening healthy, but the entire base was red and tumid. Right ureteric orifice and area around was greatly swollen and covered with fringes of necrotic tags, and a distinct line of swollen glands, like small clear grapes, edged the ulceration.

Permanent Kidney Invasion from a Primary Epididymal Deposit.

Why should the kidney become permanently affected by tuberculous changes before the bladder in 25 per cent. of the cases? I submit that the following facts throw some light upon this question.

The vas deferens crosses the ureter on the side of the bladder (Fig. 66), and these two tubes build with the corresponding seminal vesicle a small irregular triangle.

FIG. 66.



Lateral view of right side of bladder, showing gradual invasion of the bladder and kidney along the vas deferens. A, B, C. A triangle formed by the crossing of the vas and ureter embraces the vesicula seminalis. It is here that the disease may short circuit and ascend the ureter, often thickening the coats.

This triangle and its surrounding area, which for the sake of mental brevity I call the "short-circuit" triangle,

corresponds to the area in the bladder affected first by invasion either from the epididymis, or the kidney, or the seminal vesicle. It is not surprising that either or both of the components of the triangle become easily involved from a tuberculous third, and form each in their continuity a separate nidus of infection for their corresponding viscera. In the case of *primary* epididymal tubercle, I submit that it tends to infect the ureter by two distinct routes: either as it crosses it on the bladder wall, inducing in it a peri-ureteritis (short circuit), or by involving the peri-ureteric area of the bladder, and infecting the mucous membrane of the ureteric orifice. The former would account for the occurrence of kidney tubercle supervening upon tuberculous deposit in the epididymis of the same side, without any bladder symptoms being noticed.

Illustrative case.—K—, æt. 35, was sent to me by Dr. Nethercliff, of Canterbury, for severe and constant right renal pain of two years' duration. He had suffered also from right renal colic. There were no bladder symptoms, but a chronic abscess had formed in the right testicle some years previously and had burst, leaving the scar of a sinus. The vas was beaded; a pea-sized deposit was found in the right lobe of the prostate, and the ampulla of Henle was thickened. The diagnosis was blocked ureter from peri-ureteritis of a tuberculous type, the disease probably starting from the short circuit triangle. Urine 1025, clear, no albumen. I removed the right kidney. "It was small and hard. It did not look tuberculous until I released the very adherent upper end, and this portion was speckled with crude tubercle. The ureter was enormously thick and like a tight bow-string. I could have twanged it." On laying the kidney open the cortex was seen to be hollowed out by a series of tuberculous abscesses, which had extended into it from a similarly diseased pelvis. The patient healed rapidly.

It might be asked, Why should the bladder be affected first on the posterior wall to the inside of the ureteric orifice? Is not a deposit almost always discoverable in the prostate to the other side of the termination of the vas deferens at the verumontanum? The prostatic deposit is found; but it is probable that the earlier deposit,

that in the short circuit triangle, penetrates the bladder wall more easily and more quickly than the prostatic deposit, which is deposited later, and has much denser tissues of the trigone to bar its progress towards the urinary mucous membrane. Still this latter does occur, as I have previously mentioned (page 186).

There is no need to enlarge further at present upon the life-history of this class of tuberculous invasion. Like all other forms it quietly removes the mucous membrane, infiltrates the muscle planes, and cripples first one, then the other kidney. It might, however, be pertinently asked, does the destruction of the mucous membrane produced by this invasive form ever tend to heal? This may be answered affirmatively. I have found evidences of scarring after such ulceration, just as I have in every form of urinary tuberculosis. The following is a good example :

Example.—H— (O. P., xv, 294). No family history of phthisis. Left testis swelled and suppurated; it was ablated.

Thirteen years later he had "constant and cruel pain" in the left kidney, which radiated into the bladder and operation scar.

Fourteen years later, when still suffering from the renal pain, he suddenly passed a quantity of blood and clot. The hæmorrhage, which was very profuse, lasted three days. There was great frequency, and imperious desire and great urethral pain. Urine was pyelitic. No deposit in the prostate. He was placed on cod oil and morphia, and completely recovered in three months.

He returned a year later without symptoms, and I examined him cystoscopically. The urine was *brilliantly clear*; the superior wall of bladder was unnaturally white, but at the base was a very remarkable array of radiating red bridges of scar tissue. It appeared to me that the mucous membrane around the trigone has been ulcerated, and that those parts which escaped had become vascularised into thick cords, which stretched from the uninjured trigone to the healthy walls around.

The Course of Twenty Cases of Spontaneous or Traumatic Chronic Tuberculous Epididymitis invading the Urinary Tract. (No History of Venereal Disease.)

No.	Initial and time of reference.	Age at time of observation.	Which testis or epididymia.	Time at which urinary symptoms supervened.	Symptoms referred to.	Character of pain.	Character of hemorrhage.
1	W. O. P., vi, 226	38	Right (slight kick)	6 years later	Bladder: scalding, frequency	Post-scrotal before urination; relieved by act	A little bloody urine once.
2	C. O. P., viii, 162	23	Right (spontaneous)	4 years later	Transient pain in middle of right ureter; free hæmorrhage, gallon and a half (<i>sic</i>)	Perineal	Profuse.
3	K. O. P., ix, 222; xvii, 34	35	Right (spontaneous)	11 years later	Two transient free hæmorrhages	Urethral, like broken glass	Slight; only occasional.
4	D. O. P., xvii, 180	35	Left (spontaneous)	4 years later	Kidney: sudden profuse hæmaturia, with pyuria, scalding, and frequency. Nephrectomised, with relief to lower urinary symptoms	Left: posterior superior spinous process of ilium	Profuse.
5	R. O. P., xvii, 97	22	Right (kick)	16 years later	Bladder: frequency, pain, and blood at end of micturition	Glaus pain	Very little at end of micturition.
6	H. O. P., xiv, 16	20	Left (opened and scraped)	1 year later	Left kidney with great frequency. Abscess opened, frequency relieved	In back and left loin	—
7	D. O. P., xi, 395	—	Right	6 years later	Bladder: imperious desire. (Lost sight of case)	—	—
8	A. O. P., xii, 124	20	Left	2½ years later	Bladder: sudden profuse hæmaturia with great frequency; finally retention due to clot	Burning pain at peno-scrotal angle, increased by micturition	Very profuse; clot-retentions.

N ^o	Initial and reference.	Age at time of observation.	Which testis or epididymis	Time at which urinary symptoms supervened.	Symptoms referred to.	Character of pain.	Character of hæmorrhage.
16	M. O. P., xxxii, 70	46	Left (excised)	12½ years later	A little frequency and blood	—	Never much.
17	M. O. P., xiii, 414	39	Right	7½ years later	Sharp pain in penis; frequency	Sharp pain in tip of penis running inwards; also in perineum, worse on jolting or lifting. Painless	Profuse, with clot retention; lasted 3 days.
18	H. W. O. P., ix, 36	16	Left	7½ years later 4 years later	Severe hæmorrhage Frequency; supra-pubic pain on over-holding	—	Many severe hæmorrhages; clot retention; excited by cold or exertion.
19	D. O. P., x, 126	32	Right	1 year later	Frequency; pain in right kidney; then acute pyelitis	—	—
20	G. O. P., xvii, 240	32	Right	9 years later 13 years later 15 years later	Slight frequency. Long clots. Profuse hæmorrhage and perineal pain	Pain in perineum is constant, increased by micturition, improved by rest. It is relieved by pressure, and is so localised that it can be covered with the finger	—

2. *Tuberculous Invasion of the Bladder from a Primary Deposit in the Prostate.*

The statements concerning the liability of the prostate to *primary* tuberculosis are most conflicting. According to some authorities it is unknown;* most believe it to be rare. According to my experience it is rare to find the prostate the sole genito-urinary harbourer of tubercle. I can only record six instances.† These, however, have symptoms almost precisely similar to those cases just discussed (page 181),—a little gland pain, frequency, then a rush of blood; in fact, it would appear that all indolent *invasions* of the urinary mucous membrane by chronic tubercle elicit profuse hæmorrhages. On cystoscopy, a dark red swelling will be found on the trigone (Fig. 67) over the affected lobe. It might be asked, why does the tubercle not appear in the prostatic urethra?‡ I do not know. I can only say that this line of primary invasion does not seem frequent, and I have only met with it in a case of galloping urinary tubercle.§

The primary invasion follows in its extension the same laws as all other genito-urinary tubercle.||

* "The prostate is never the seat of primary tuberculosis."—Sir H. Thompson. Socin has had an experience of six.

† I should say this estimate is wrong. Cases do not apply very early, and by the time they are examined the deposit is often in more places than one. Moreover I have eliminated gonorrhœal cases, and of these there are a good few.

‡ "As the tuberculous masses increase towards the mucous membrane ulcers form in the prostatic urethra."—Morris, *ibid.*, p. 318.

§ Author, 'Path. Trans.' vol. xxxviii, 1887, p. 187.

|| *Routes taken by Urinary Tubercle.*—Urinary tubercle invades the different sections of the urinary tract along certain regular highways. It commences most often in the epididymis (33 cases in 158). It is next felt in the corresponding lobe of the prostate, next in the base and around the ureteric orifice of the corresponding side of the bladder, and lastly, in the middle and lower third of the corresponding kidney near the pelvis.

Thus "the rule of the road" is, a right epididymal knot leads to a right prostatic knot, to a loss of surface around the right ureteric orifice, and finally to a deposit in the right kidney. An epididymal knot sometimes short-circuits to the kidney of the same side. No matter whether the

FIG. 67.



Bladder and prostatic urethra laid open. Shaded areas **A** mark the site of invasion of bladder and urethra from a tuberculous deposit in the corresponding lobe of prostate.

Illustrative Cases.

S— (P. xxv, 58). Sent to me by Dr. Collier (Oxford).

One day, whilst urinating after lunch, he noticed a pain in the deposit absorbs in one place, the wave travels persistently on, to implicate another area, and it usually keeps to the side it started on.

Bypaths.—In addition to the main route taken in the above case, there are, of course, two bypaths of invasion. There is one running from the right prostate to the left prostate or left vesicle and to the left testis, and another passes up along the other ureter to the other kidney, if the patient lives long enough.

Cross-route Tubercle.—But this rule of the road is too absolute. It does not, unfortunately, hold in every case. In 18 cases out of 100 the tubercle appeared to cross over for some unexplained reason. Thus the deposit might be in the left testis and cross to the right kidney, or in the right testis and cross to the left prostate. We must remember, then, that in a small proportion of cases (18 per cent.) tubercle crosses.—Author, Clinical Lecture upon "The Rectal Contour of One Thousand Prostates," 'Brit. Med. Journ.,' pl. i, p. 395, 1899.

urethra, and on looking down he found he was passing a few drops of blood. He also had a straining feeling as if he did not empty. No frequency; nothing further for ten days.

Ten days later suddenly a quantity of bright blood was passed and frequency at night supervened. Tubercle in urine. Small deposit in each prostatic lobe. No cystoscopy.

C—, æt. 26, a patient of Dr. Carvell's. The patient first noticed blood in his urine on April 8th, but for some days previously he had been compelled to pass water very frequently. He has also experienced a good deal of smarting pain in the perineum and penis. On April 9th, when he came under observation, the urine was very bloody, clots and almost pure blood being expelled at the finish of the act. Sp. gr. 1026, acid. On rectal examination the right lobe of the prostate was found to be very hard, though the bulk was not increased. The left lobe contained a hard nodule the size of a small marble. On April 17th, a week later, on passing the cystoscope and completely rotating it, the base of the bladder on the left side was seen to be covered with small punched-out ulcers; the base of most of the ulcers had still adherent to them little yellowish sloughs—clear evidence that the change was very recent; whilst more anteriorly an extravasation beneath the mucous membrane had caused a body of deep red gelatinous appearance to be formed, somewhat like a commencing epithelioma. Five days after the examination the following is noted:—"The urine is now free from blood and pus, and patient suffers no pain during or after micturition." I lost sight of this case.

H—, æt. 29 (Dr. Alexander, Epsom). Perfectly well until June 15th, 1892. Suddenly felt a slight pain at the glans at the end of micturition, and he glanced down and noticed a drop or two of blood. Quite well for five weeks; he then passed, without pain, a quantity of dark fluid blood.

Fourteen days after this last attack more blood appeared, and greater pain at the glans after urination was experienced. Frequency commenced at night.

Four months after onset I saw him. The testes were normal, but the left lobe of the prostate contained a monkey nut-sized deposit.

Cystoscopy.—Bladder wall healthy, congested area in trigone.

A year later his left seminal vesicle swelled. Tubercle was found in the urine.

Two years later the left epididymis became swollen, then the right.

Six years later the deposit in the left lobe of the prostate was cretaceous, but the left kidney was enlarged and tender.

Treatment of the Invasion of the Bladder from a Primary Tuberculous Source in the Epididymis or Prostate.

The treatment for this is, and must be at present, disappointing. As long as tuberculous foci in the epididymis are allowed to remain to the future distress of the patient and discredit of surgery, so long will the surgical treatment of the vesical invasion by genital tuberculosis be an almost hopeless task.

I should countenance and advise the entire removal of a tuberculous testis in a non-venereal patient almost as soon as it is noticed, *if* no feelable deposits in the prostate or vesiculæ seminales can be detected. It may be argued that the chronic epididymitis due to posterior urethritis cannot be distinguished from an almost similar nodular mass in the epididymis due to tuberculosis. It is not necessary, I submit, to entertain the question. If there has been a history of urethritis the disease has passed, whether it be gonorrhœal or tuberculous, along the prostatic channels, and it is almost useless to remove a tuberculous testis (unless actively suppurating) if there is any prostatic infection. But to remove a testis the seat of primary tuberculosis not only eradicates the original source of the mischief but also causes atrophy of the corresponding lobe of the prostate and disuse of the vas and vesicle. This perhaps may reduce the vulnerability of a large section of the high road along which tubercle advances (see page 195). But presuming the case to have only applied for treatment when the mucous membrane of the bladder has shown signs of invasion, I should advise first cystoscopy to ascertain the character of the deposit; if areas of infiltration and extravasation are noticed, a course of Koch's tuberculin should be given. Finally the open ulcers should be curetted if they do not show any tendency to heal.

3. *Primary Renal Tuberculosis invading the Bladder.*

It is often difficult to determine upon clinical grounds, the exact origin of urinary tuberculosis. The problem is even more obscure when careful cystoscopic evidence is taken. For instance, chronic tuberculosis of one kidney is occasionally *latent*, and destructive changes progress quietly in the gland without evoking any symptom beyond perhaps a vague backache. Suddenly the bladder becomes irritable, and the changes seen in that viscus may be erroneously supposed by the cystoscopist to indicate *primary* vesical tuberculosis. Again, great œdema of the trigone and dysuria may be caused by the flow of acrid irritating urine from a tuberculous kidney, and these visual changes at the bladder base may mislead the observer, and cause him to diagnose primary vesical tuberculosis when in reality the focus of irritation is in the kidneys.

It is, I submit, safest to select for purposes of clinical study only those patients who complain solely of renal pain (fixed or radiating); those in whose urine tubercle bacilli are easily found, but in whom no lower urinary symptoms are manifest.

I am not prepared to say that my work on this particular subject is sound. My material has not been large, though it has been rigidly controlled by post-mortem examination (five cases), and by operative interference (fifteen cases), as well as by many cystoscopies of *bonâ fide* tuberculosis of the lower urinary tract.

I propose to advance certain propositions for criticism.

POSTULATE 1.—*Primary renal tubercle approaches the bladder by way of the ureter, not always, as one would conceive, by the urine stream, nor yet by the surface of the mucous membrane in its continuity, but often by a gradual progress along the lymphatics which accompany the ureter, or by the structures composing the wall of that canal. Whether tubercle reaches the bladder by the wall of the ureter or by*

its lymphatics, it breaks into that viscus through the sub-mucous layer around the ureteric orifice (Fig. 67).

Just as in primary tuberculosis of the bladder it is not the epithelium which is first involved, but the deeper layers of the mucosa; so in ureteric tuberculosis it is not the epithelium of the orifice and the surrounding area that is involved, but the deeper layers of the mucosa.

Hence the early visual appearance of the invasion of the bladder from a tuberculous kidney is exactly similar to that characterising a primary vesical tuberculosis, if we except the changes of the ureteric orifice. The difference lies only in the position. In the former the extravasation areas are grouped around the ureteric orifice instead of *between* the ureteric orifices, as in the primary form. Certain well-marked changes in the appearance of the ureteric orifice serve, however, to distinguish between the two forms.

POSTULATE 2.—*The sudden appearance of the symptoms characteristic of tuberculosis of the bladder—the frequency of micturition, the meatal pain after the act—does not necessarily indicate that tuberculosis has actually reached the bladder. It denotes that one of two conditions is present.*

(1) It may merely point to irritative swelling of the ureteric orifice and its corresponding half of the trigone, induced by the descending irritative urine from an *inflamed* tuberculous deposit in the renal pelvis. This occurs early in the course of the renal disease, and as often as not these lower urinary symptoms are transient, with or without treatment.

Example.—W. T—, æt. 19 (Dr. Weakley's patient), had suffered for three months from occasional but not severe pain in the right kidney, latterly frequency at night and pain at the glans penis after micturition had been complained of.

Urine 1015, faintly alkaline; it contains a trace of albumen, a small amount of pus, numerous crystals of oxalate of lime, cells

from the mucosa of the renal pelvis and from the bladder, but no casts. Tubercle bacilli in large numbers.

There was no temperature. Sandal oil was useless.

Cystoscopy.—"Bladder entirely healthy except at the right half of the trigone. This part, with its corresponding ureteric orifice, is puffed up into a gelatinous irregular mound. There is no tubercle in prostate, testes, or vesiculæ seminales to be felt."

Six injections of Koch's new tuberculin were administered, $\frac{1}{100}$, $\frac{1}{100}$, $\frac{1}{100}$, $\frac{1}{100}$, $\frac{1}{100}$, $\frac{1}{100}$, 1 mg. These produced no rise of temperature.

The tubercle bacilli decreased in numbers.

Irritability of bladder and pain disappeared after the last injection, cystoscopy showed a decided flattening of the oedematous area on the trigone.

Clinical evidence of this fact is decided. Every operating surgeon can adduce cases in which uncontrollable bladder spasm, frequency, and pain were absolutely relieved by nephrectomy of a tuberculous kidney. The immediate relief is of course obtained by cutting off the stream of irritating urine.

(2) The occurrence of lower urinary irritability may show that the tuberculous disease has reached the lower third of the ureter, and has involved that section (half inch from the bladder) which is in reality part of the bladder. The same symptoms are evoked by disease of this part of the ureter as if the bladder itself were involved. Hence, although the cystoscopist may find no evidence of disease in the bladder, yet the disease may be within an inch or so of the viscus.

Example.—W. M.—, æt. 46 (O. P., viii, 194). Dr. C. M. Corner sent this patient to me in 1890.

The initial symptom was severe left renal colic—no lower urinary symptoms; four years after onset dysuria supervened; four and a half years after onset his frequency was every hour in the day and six times at night. He had severe pain and tenderness in the left kidney. There was no tubercle in the urine. This patient's distress was so great he would not wait for me to make up my mind what to do, but entered another hospital. I followed him and watched the case. The operator opened the bladder supra-pubically. No relief was obtained by the drainage thus afforded. Perineal section was performed seven days later; the patient died a few days after this.

On post-mortem, which I attended, the entire left kidney was found transformed into a loculated sac of tuberculous material.* The left ureter was enormously thickened, the periureteritis reaching almost to the bladder wall. The most careful scrutiny of the bladder failed to detect the smallest ulceration. There was a thin layer of tubercle between the body of the left testis and epididymis.

CYSTOSCOPY OF VESICAL INVASION FROM A PRIMARY RENAL TUBERCULOSIS.

This may be roughly and arbitrarily divided into two stages.

First Stage.—In the earliest stage the orifice of the ureter has lost its slit-like shape. It is *open*, its lips are rounded, the epithelial surface is dull, the area around it is swollen and patched with extravasation;† perhaps small, clear, grape-like glands are visible near it. If however, the adjacent postero-superior wall is examined, vivid red or dull red extravasations are visible (Fig. 68), the surface of which may be peeling. The rest of the bladder is healthy; the opposite ureteric orifice is normal.

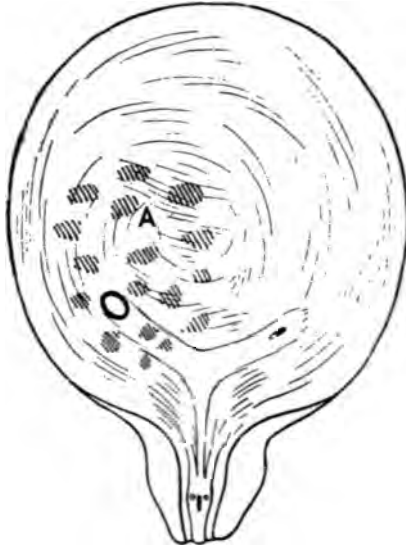
It is, however, in the next and more advanced stage that the cystoscopy becomes more certain, for the orifice becomes characteristic, and moreover if the kidney retracts under the ribs, as it does in that class in which the kidney is inflamed without forming abscess, the ureter becomes stretched, the vesical orifice becomes displaced, and the lower angle of the bladder base is "pulled out."

* This characteristic of the lower end of the ureter to evoke bladder distress is often misleading. Compare chapter on "Ureter—descending stone."

† It is believed by Meyer that punctiform hæmorrhages occur around the ureteric orifice in tuberculosis descending from the kidney. This may be so, but I have seen these fine petechiæ in cases of descending renal calculus. I may support this statement by referring to a boy whose mother had died of phthisis. He had a typical tuberculous aspect, and his symptoms were those of early renal phthisis. The right ureteric orifice was surrounded by punctiform hæmorrhages. No tubercle bacilli could be found in the urine. I explored the right kidney, expecting to have to remove it, but it was quite healthy, and the patient subsequently passed an oxalate of lime stone.

Second Stage.—That of caked patulous *displaced* ureteric orifice. The orifice of the ureter leading to the tuberculous kidney now changes very decidedly in appearance. It becomes an irregular sharply cut hole, with a thin whitish inlaid edge, as if surrounded by wax

FIG. 68.



Bladder and prostatic urethra laid open. Descending tuberculous invasion of bladder from tuberculosis in right kidney marked by shaded areas A. The right ureteric orifice is large, open, and *displaced*.

or lard. Part of the mucous membrane may proptose and appear as a red segment in the white circle, but this is not, I believe, common. The position of the orifice may also be changed; it may become displaced, and the bladder funnels slightly towards the hole because the walls are pulled out by the retraction of the ureteric tube (q. v.).

The area around has also changed its character, the ecchymosed areas are now pinched up, and each pinch is *fixed*; it cannot be expanded by over-distension.

Here and there these sharply pinched red ridges are ulcerated. Moreover vibices cross the posterior wall, the opposite ureteric orifice is changing its shape, and it is obvious that the entire viscus has become affected.

Note on the Displacement of the Lower Orifice of the Ureter, with dragging outwards of the Lower Angle of the Bladder Base in Renal Tuberculosis.

I wish to draw attention particularly to this phenomenon, for I believe that when it is present it affords the most conclusive cystoscopic proof of the partial destruction of a *small unfeetable* kidney by tuberculosis. It consists, as I have said, in the displacement of the vesical orifice of the ureter from its normal position in the posterior superior angle of the trigone of the bladder. Instead of being an inch and a half from its fellow, and at the same distance from the urethral orifice, it is often found to be as much as two inches from either opening. The bladder side is seen to be slightly funnelled into the diseased ureteric orifice, and that side of the bladder base to be "pulled out."

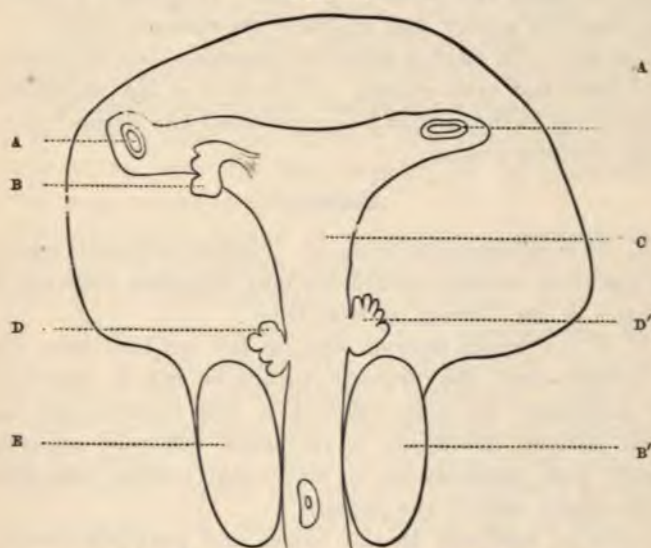
This is readily recognised at an autopsy,—in fact, I noticed it first during a post-mortem examination of an advanced case of urinary tuberculosis (Fig. 69). I did not understand it at the time, but merely noted it. When I found the same fact recurring in cystoscopy I realised I had acquired a diagnostic point of some importance.

The displacement occurs whether the entire ureter is tough and extremely thick, with chronic ureteritis (Gargantuan ureter), or whether the lower third of the ureter only is thus affected. As far as my material serves, there is, I find, always retraction of the kidney under the ribs, with fixation of that organ from inflammation and adhesion to the liver on the right, and to the stomach and spleen on the left, when the orifice is found displaced.

This retraction and fixation of the kidney causes

stretching of the ureter. I believe the lower third of the ureter is always thicker and inextensible, for the condition is still noticeable after nephrectomy and upper ureterectomy.

FIG. 69.



Trigone of bladder showing the right ureteric orifice A displaced by reno-ureteric tuberculosis (cf. page 113).

But most chronically inflamed kidneys, tuberculous or not, in my experience lie high up under the ribs, and tend to become fixed at both ends, the upper and the lower. They only descend, *or seem to descend*, from under the costal arch, to become apparent to touch or sight when an abscess in the cortex has increased the actual size of the gland, or a decided enlargement of the entire organ has taken place. Do the ureteric orifices of such kidneys become displaced? I cannot say; I have not noticed it, and I believe the difference between the two groups—the tuberculous and the simply inflamed,—in the drag action which they exert on the ureter, is that in the tuberculous the ureter is infiltrated, and cannot stretch without dragging

at the bladder insertion of the orifice; whilst in the simply inflamed kidney the ureter retains its lissom extensible property. But in some tuberculous kidneys there is a great thickening of the organ, and it forms a fixed mass which is easily felt under the ribs. Does such a kidney drag upon its ureter and displace its vesical orifice? I cannot say. In such a case the diagnosis has been easy, and I have not cystoscoped. It is only in the unfeeleable tuberculous kidneys that I have noticed the displacement of the ureteric orifice.

Axioms.

(a) If a cystoscopist finds an irregular-shaped, caked, and patulous ureteric orifice, he may diagnose destructive changes in the kidney of that side.

(b) If no renal tumour can be felt on that side, and he notices that the ureteric orifice is caked, patulous, and displaced, he may proceed a step further and diagnose without hesitation a retracted inflamed adherent kidney, with probably one or more *small* cortical abscesses in the upper end of the organ.

(c) If in addition to the caked and patulous ureteric opening tubercle bacilli are present in the urine, destructive tuberculous changes of pelvis of the corresponding kidney may be diagnosed and the kidney nephrectomised, provided that the opposite ureter appears healthy, and the urine from it (obtained by catheterising its ureter) appears abundant and of good specific gravity.

(d) He may suspect the renal origin of urinary tuberculosis if he finds with this caked, patulous, and displaced ureteric orifice, that extravasations are strictly localised to the ureteric area.

(e) But if the disease is already far advanced in the bladder, and much of the mucous membrane is stripped away, he cannot on cystoscopic grounds assert that the disease originally commenced in the kidney, although the ureteric orifice is caked, patulous, and displaced, for these changes are also induced by extension from below

upwards. All that now can be asserted under these circumstances is that the kidney is undergoing destructive tuberculous change.

The Advantage gained by these Cystoscopic Facts.—A patient applies with tubercle in the urine and an easily felt moveable kidney, in or around which a slight aching is complained of. Is that kidney to be removed? It is a tempting diagnosis to locate the tubercle in that kidney, and to advise nephrectomy. But in some cases the clinician will be wrong, and the operator will remove the *wrong* kidney if he acts on this impulse, for the moveable kidney may be the healthy gland.

Tubercle of the kidney in some cases progresses very quietly, and as the disease gradually cripples the secreting texture its fellow-gland takes on more and more of the work. With the increased activity it enlarges and often *aches*. In women especially, a compensatorily hypertrophied kidney becomes feelable and moveable. Cystoscopy will show in this case that the feelable and moveable gland is healthy, for it has a normal or slightly enlarged ureteric orifice, whilst the opposite kidney will be seen to be diseased, for its ureteric orifice has an irregular outline, a widely open thickened mouth, and that it is displaced.

Let the latter kidney and as much as possible of its ureter be removed, and the patient, other things being equal, will have been operated upon with judgment.

Example.—A lady, æt. 32, was brought to me by Dr. Delamotte, of Staines, on January 7th, 1895, with a two years' history pointing to urinary tuberculosis. I gave this diagnosis, but as her uterus was misplaced I requested a gynæcological opinion concerning the influence of the uterus on the ureter. The patient returned with Dr. Delamotte two years later. A gynæcologist had been consulted, and having pooh-poohed the diagnosis of tuberculosis, he had been actively treating the womb. Latterly, finding the patient's urine contained albumen and blood, and that her *right* kidney was enlarged and moveable, this gentleman had diagnosed moveable kidney, and had decided to perform nephrorrhaphy. I was then (January, 1897) asked for my opinion, and obtained permission to cystoscope.

The *left* ureteric orifice (Fig. 70) was patent and caked; it was obviously tuberculous. I did not notice any displacement,—in fact, I was not then alive to the significance of this condition. The right ureteric opening was healthy. Tubercle was found in the

FIG. 70.



Exaggerated diagram of a caked and patulous left ureteric orifice.
The size is not to scale.

urine, and relying on the caking and patency of the left ureteric opening, I diagnosed tuberculous destruction of the left kidney and ureter, and removed the organ by the lumbar incision.

It was a collection of tuberculous abscesses with thin phosphatic shells—"dirt-stones." The lady recovered, the wound healing by first intention. The specimen was examined by Mr. Targett and reported to be tuberculous. Had the right kidney been stitched, as suggested, the result would not only have been futile but perhaps fatal.

Cystoscopy (after two years).—Left ureteric orifice still open; bladder not ulcerated; right ureteric orifice healthy.

I have watched this case three years. Tubercle bacilli have never been found since.

Symptoms of Primary Renal Tuberculosis.

To enter fully into the symptoms of renal tubercle does not lie within the scope of the work, but the following remarks are sufficiently germane to the subject to be included.

If we omit the very rare form of latent tuberculosis,

there are certain pronounced symptoms which, when taken in conjunction with the passage of tuberculous urine, lead one to suspect primary renal tuberculosis. The cases range themselves in two distinct classes: (a) those with fixed renal pain; (b) those with renal colic.

(a) *Tuberculous Kidney evoking Fixed Renal Pain and Early Pyuria.*—This class is much more commonly met with, 80 per cent. The symptoms seem to depend on the destruction of the pelvic mucous membrane and renal structure, the urine and débris escaping freely along the open channel of the ureter. Although there may be some thickening of the walls of this tube from peri-ureteritis, yet the channel is wide enough to carry off the secretion without exciting renal colic as a general rule, though occasionally a clump of mucus or débris may be caught and may give rise to a colic. The renal pain is at first slight and intermittent, disappearing for weeks, but reappearing in a more severe form until it becomes constant. It is chiefly felt behind, over the lower ribs; it is coverable with the palm of the hand (not the thumb, as so often appears to be the case in oxalate of lime stone). After a few months the patient becomes liable to transient attacks of frequency of micturition and meatal pain after the act. These attacks will vary in duration from a few hours to a few days, and may be due to the caustic action of the urine or to transient attacks of descending pyelitis. Probably the former, for it is conceivable that now and again ptomaines from the colon, or chemical substances produced by the disintegration of the tuberculous processes, are added to the secretion which, passing over the sensitive neck of the bladder, evoke passing dysuria (cf. case, page 200).

As months pass the renal pain ceases, but coincident with its subsidence appear those symptoms which are characteristic of vesical invasion—frequency of micturition, glans or meatal pain after the act, and occasional slight hæmorrhages.

When the bladder has become definitely ulcerated there is a "posture" symptom of some value which may be present in women. When the ureteric orifice has become ulcerated, the patient cannot sleep on that side at night. For this position aggravates the irritability of the bladder. The patient, therefore, keeps on the side opposite to the diseased ureter.

(b) *Tuberculous Kidney evoking Renal Colic.*—Primary tubercle of the kidney may in the minority of cases (20 per cent.) produce renal colics almost exactly like those of renal stone, and this almost from the onset of the disease. The first symptom may be a renal colic, and the attacks may continue until the kidney has given up secreting urine. The colic is due to the narrowing of the pelvic orifice of the ureter and to thickening of the ureteric wall. It is surprising how thick the ureter can become; some are the thickness and *solidity* of thumbs or forefingers, and on section a tiny circle represents all that is left of the ureteric channel. I venture to suggest that in these cases there is an inherited tendency to *fibroid* phthisis. I believe that when such kidneys are shut off by occlusion of the ureter, the lymphatic trunks of the channel become plugged, and the disease is walled in. Anyway these patients seem to enjoy a longer lease of life, and to be the more favourable subjects for obtaining a cure by nephrectomy.

Treatment.

(a) In the "fixed renal pain" group.

I make it a rule in my own practice, when a young adult patient is passing pyuric urine and is complaining of aching in one loin, to have the urine examined for tubercle, whether there is a family history of phthisis or not. If tubercle is found, and there are no symptoms of bladder irritation, I advise a course of Koch's new tuberculin, on the chance that the disease is limited, and that it may become so affected by the injection as to break down and pass by the natural channel, for we are

quite unable to say how much of the kidney is affected. I do not consider it advisable to cystoscope unless one is able to do so in the natural medium, and this rarely occurs. If the treatment proves ineffectual I nephrectomise.

If tubercle cannot be found in the urine it is of paramount importance, in cases where the family history of phthisis is marked, to cystoscope and examine the ureteric orifice and its neighbourhood in order to ascertain the cause of the renal pain, whether it be due to primary renal tuberculosis or stone.

(b) In the renal colic group.

In treating primary renal tuberculosis marked by renal colic I object to the use of Koch's tuberculin, for I hold that the renal colic is absolute evidence of tuberculous invasion and thickening of the ureteric channel, and the swelling of the deposit in the wall of the tube caused by the injection is quite sufficient to block the tiny channel which often remains. The tissue changes which take place in the kidney, as a consequent of the tuberculin injection, are thereupon retained, and may induce swelling of the organ and extension, for the inflammatory wall which the disease has already constructed around the dangerous foci is easily overstretched, and permits of a leakage into the perinephric tissues. It is probably better in the renal colic class to nephrectomise immediately after cystoscopy of the ureteric orifice.

CHAPTER XI.

MALIGNANT ULCERATION OF THE BLADDER.

IN one sense it is true that every form of malignant disease of the bladder may be comprehended under the title of this chapter, for every form sooner or later breaks down and its surface becomes ulcerated, but this is not, I submit, the correct definition of malignant ulceration.

Epithelioma, the malignant disease of the bladder, is subject to great variation; at one time the stress of the disease falls upon the epithelial layer, and large fungous masses are formed; in other cases it is the submucous layer which is more especially affected, and great density of this and the underlying tissues result. This variation in form and character depends, as Gross* originally pointed out in 1876, upon the extent to which squamous evolution is present. (Paul, 1884.)†

There is, then, a variety of epithelioma which takes the form of an ulceration, visually comparable in its early stages to rodent ulcer or epitheliomatous ulcer of the skin. It is to this particular group that the term malignant ulceration should be applied.

It is a rare disease, if I may judge from the museums of Europe, the literature, and my own experience, for I have met with only a few cases in actual practice. Those

* S. D. Gross, 'Diseases of the Urinary Bladder,' 1876, p. 143.

† "The usual variety of carcinoma of the bladder is the epithelial; what was formerly called scirrhous is nothing more than the firm, infiltrating form of epithelioma, characterised by a dense stroma of fibrous tissue, pervaded by small and infrequent alveoli which contain heaps of loose epithelial cells and epidermic pearls. The soft, juicy medullary or fungoid affection generally denominated encephaloid is of the same nature." (F. T. Paul, 'Brit. Med. Journ.,' Jan. 12th, 1884.)

I have seen agree in their general features with the isolated instances which have been reported from time to time in the literature.

Cystoscopy.—Such cases do not bleed easily in the earlier stages, and they seem also to be very tolerant to the impact of the sound. Probably this is due to the dense structure of the ulcer. If the bladder be over-distended, however, they bleed freely, and cystoscopy is futile.

The typical aspect of the growth resembles the ordinary epitheliomatous ulcer of the skin. The base is uneven, nodulated, and sloughy. The edges are upraised, indurated, and sinuous. The site is usually at the trigone whence the adjoining walls are invaded, but the posterior wall low down is also a favourite area. It is exceptional, I believe, to find, either on cystoscopy or post mortem, any trace of "villous covering." Villous processes may be present in the very earliest stage. In fact, judging from the frequency with which invading growths approaching the mucous surface of the bladder from the peritoneum are heralded by a layer of villous processes,* this form of hard epithelioma should also be temporarily covered by villous processes. Probably they dehisce and are cast off with the sloughs which are formed by the necrosing surface; anyway they are never seen. The ulcer is invariably single.

Hilton Fagge thus describes a case. The bladder was contracted to about the size of one's fist. Its wall was three eighths of an inch thick. Its lining membrane was deeply inflamed. Its posterior wall displayed an open ulcer of about the size of a five-shilling piece, with an irregular, sloughy surface, with thick, raised, everted edges, and with its floor and margin alike infiltrated with an opaque, white, soft growth, obviously of malignant nature. The microscope showed that this was a typical squamous epithelioma with numerous and large bird's-nest aggregations.

* Author, 'Tumours of the Urinary Bladder,' fasc. i, p. 33.

The edge.—The prominent edge is thick, and the surface marked by minutely injected vessels. It spreads slowly, invading the deeper layers of the bladder as it eats its way on the surface, and it finally covers large tracts of the bladder. Thus in one case (Hill's) * it stretched on the inner surface of the pubes, along the right side to the apex, and thence crossed to the left. On the right side the growth was much the thickest, whilst on the left its advancing margin was raised a quarter of an inch above the level of the mucous membrane.

The base.—The surface of the ulcer is usually nodulated. It is at first strictly limited in extent, for the growth infiltrates the subjacent wall, but it does not tend to diffuse itself far in front of the rolled margin just mentioned. The depressed base of the ulcer patch depends upon the destruction of the growth which originally rose slightly above the level of the mucous membrane, and it sometimes happens that on cystoscopy, or post mortem, small loose or semi-adherent masses of broken-down material are met with. Thus in Hilton Fagge's case several soft masses lay loose in the bladder as large as nuts or almonds, all showing "nests" microscopically. In parts of the ulcer the destructive change may not have been sufficient to convert the surface into a shallow depression, and a lumpy, uneven-surfaced growth, with the abrupt raised edge described above is met with. This condition is easily recognised by the finger.

Causation.—Hilton Fagge,† who observed two cases, seems to have considered that irritation plays no unimportant part in the causation of the ulcer. He says, speaking of a case in which the patient had habitually passed an instrument for twenty-seven years: "It will be observed that the seat of the ulcer was not at the trigone, but behind it, corresponding exactly with the spot at which the point of a catheter would impinge upon

* Berkeley Hill, 'Brit. Med. Journ.,' 1881, p. 758, pt. 1.

† Fagge, 'Path. Trans.,' vol. xxviii, p. 168, 1877.

the vesical wall, and where an ecchymosis is not uncommonly found after the introduction of such instruments, as Mr. Hilton long ago pointed out."

It is remarkable that the three openings of the bladder escape being the primary site of epitheliomatous ulcers.

Symptomatology.—With very few exceptions the disease commences after the age of fifty, and nearly always affects the male sex. Its symptoms markedly resemble those of stone in the bladder.

Frequency of micturition and pain in the glans penis after the act are the initial symptoms, hæmaturia being a later symptom. In this it differs from the softer form of epithelioma, where hæmaturia is the first symptom, and frequency and glans penis pain appear later. At first there are marked intervals of ease, occurring apparently without cause, amounting to weeks of rest; then the frequency and pain recurs. Often as not it is a chill or exposure to wet which causes a relapse. The symptoms may be examined in detail.

Frequency.—Like other ulcerations of the bladder, this—the epitheliomatous ulcer,—even when quite superficial, keeps the bladder in a state of extreme irritability. The perpetual irritation of the exposed surface induces a great desire to urinate, and even when the act has been completed the patient has not the satisfied feeling of relief. Any slight over-distension, even four ounces, induces some spasm of the detrusor and imperious desire, by dragging on the edge of the ulcer. When the muscle becomes exposed the frequency is still more marked, until finally the bladder wall becomes infiltrated with irritating growth, and its capacity so lessened that only a few spoonfuls can be retained.

Pain.—The disease is of all forms of vesical growth the most painful, and the lumbar, perineal, groin, and leg neuralgias are often most distressing. This is due to the hard, tough growth compressing the nerve-trunks of the base. The pain chiefly complained of is a *constant* penile pain. This may be so severe as to cause down-

right agony. One man, a patient of Mr. Nunn's,* cut off the end of his penis with his knife to relieve himself. In rare cases, when the ulcer is high up on the posterior wall, the pain may be supra-pubic and increased by micturition.

The pain of spasm in the later stages, which is common to all infiltrating growths, is in some cases almost "tetanoid." I have watched waves of severe spasm succeed each other every twenty or thirty minutes, the patient holding his breath and straining with every muscle of respiration, ordinary and extraordinary, in his effort to relieve his bladder of a teaspoonful of urine. It might be supposed that supra-pubic drainage would relieve such suffering, but with the bladder the size of a small Tangerine orange the presence of the tube does more harm than good. Even the soft, blunt nose of a Jacques' catheter placed in the bladder through a supra-pubic opening causes the greatest pain, which morphia in toxic doses does not adequately relieve.

Hæmaturia.—Bleeding is not, in my experience, so marked a symptom in epitheliomatous ulcer as it is in the softer form of epitheliomatous tumour, nor does it usually depend upon movement, as some of the softer growths seem to.†

Phosphatic "dirt" stones.—An additional source of agony to the patient consists in the encrustation of parts of the ulcer or its slough with phosphate of lime. These spongy, pumice-stone pieces fret the bladder and block the sensitive prostatic urethra, necessitating the use of a catheter or even the lithotrite.

As the epithelioma traverses the muscle wall it becomes

* Nunn, 'Path. Trans.,' vol. xix, 1868, p. 264.

† A case in point:—Sir H. Thompson records ('Path. Trans.,' vol. xviii, 1867, p. 162) a case of a gentleman, aged 61, who used to have severe bleeding on any exertion, even on going upstairs. On post-mortem, a large mass of very soft and broken-down material, loosely attached to a growth of wide base, circular in form, about three inches in diameter, was found, occupying the floor and part of the right side of the bladder. There was no induration of the base nor of the parts around.

detectable *per rectum* as a thick, dense plaque; and later, the hardness can be often traced to one or other groin by implication of the lymphatics along the iliac vessels. The ureter of that side upon which the ulcer arises, usually becomes partially blocked or throttled by hard growth, the corresponding kidney first becoming inflamed, then useless. The other kidney and ureter are then enlarged and vulnerable to ascending septic pyelitis, to which the patient often succumbs.

Example 1.—Six months before I saw G. D—, whose age was only thirty-two, he began to have pain at the top of the penis when he made water, a scalding pain being left in the same position after micturition. This gradually got worse, and he began to pass "mortar." Then he had pain in his left side. Three months after the onset a few drops of blood appeared at the end of urination; there was no straining. When I saw him first he was passing water every two hours in the day, and had to rise thrice in the night. He had moderate pain in the glans penis after micturition, and occasionally passed blood. He showed me large pieces of necrotic *débris*, permeated with phosphate of lime salts, which he had passed. Prostate and testes normal; urine acid.

On cystoscopy I discovered on the right side of the base a crateriform ulcer with an upraised gelatinous edge. At the inner and upper part a white, phosphatic, necrotic tag was adherent. The base of the ulcer was irregular, but showed no granulations. It was apparently excavated mucous membrane. The thin inside edge of the ulcer was very sharp.

I did not deem the case operative, and lost sight of him, but he came under my care twelve months later. He had lost flesh. He was then passing water every twenty minutes, day and night, with extreme pain. Small pieces of phosphatic material were constantly forming in the bladder, and either blocked the urethra or caught in the eye of the catheter with which he used to wash the bladder out. He asserted that they grew from the wall, and that he could feel them drop off into the cavity. If he did not constantly wash out, the scalding pain was unendurable. The bladder, *per rectum*, felt like a hard cake of cancer. It held an ounce of medium. I watched this patient for eight months. Whenever he could not get rid of the phosphatic stones, which usually came away every three days, I used to crush and evacuate them. The urine became indescribably fetid and his pain most severe. Shortly before his

death he took $4\frac{1}{2}$ grains of morphia by the bowel and 30 m of the B.P. solution subcutaneously,—all this within a few hours; the relief afforded was, however, only slight. I obtained a partial autopsy, and found the bladder equal in size to a small apple, but quite dense with infiltration. It was adherent in every direction; the left ureter and kidney were enlarged and in a state of pyelonephritis, and here and there were small patches of growth breaking down in the cortex. The right kidney had been completely blocked with ureteric growth. Its pelvis was dilated and full of pus.

Example 2. An Earlier Case.—C. H. D—, aged 68, was brought to me by Dr. Lewis Evans. Symptoms had only been noticed for two months. They consisted in difficulty in micturition, some frequency, and a little blood in the urine after a hard motion. There was nothing definite to be felt *per rectum*.

Cystoscopy.—A small excavated ulcer, the size of a shilling, occupied the right edge of the trigone, and extended towards the right ureteric orifice; it looked precisely like an undermined tuberculous ulcer, but by tilting the beak I obtained that unequivocal test of a hard based ulcer on a soft surface—the sharp roll and snap as it was turned up on its side by the beak pressing on the posterior wall, like a hard chancre snaps back when the prepuce is retracted.

Medicinal Treatment.

Such cases are nearly always associated, as in fact most hard carcinomata are, with the uric acid diathesis. It is surprising what relief can be obtained in the earlier stages from the pain, but not the frequency, by means of such drugs as hexamethylen tetramine and piperazine, combined with small doses of *Collinsonia canadensis*. This result is probably obtained by reducing the hyperacidity of the urine. On the other hand, of all forms of urinary disease, this, I regret to say, is the most difficult to relieve as the end approaches. I have narcotised patients with morphia and belladonna without success; the pain continues, and if spasms are a feature in the case, they recur with an incredible obstinacy and severity. The only relief the patient can be afforded if opiates fail is operative, and this only in those cases where the ulcer is on the trigone and posterior wall.

*Operative Interference in Selected Cases—Detrusotomy—
Anterior Cystectomy—Pithing of Spinal Cord.*

If the bladder is contracted there is not the slightest use promising the patient relief from spasmodic pain by supra-pubic drainage—a promise one so gladly tenders in other vesical diseases when a large amount of residual urine is present. Nor is perineal drainage wise if the urethral orifice is involved, for the suffering is greatly increased by the tube. The only relief surgery can afford when the spasms become unendurable is division or resection of the detrusor muscle—detrusotomy or anterior cystectomy, preferably the latter. The upper two thirds of the detrusor muscle of the bladder, if it be free from growth, is cut away by a *transverse* supra-pubic incision, and the urine allowed to well up along the extensive gap that is thus made. No catheter or drain can lie in the bladder; the supra-pubic and thigh regions are kept coated with a thick zinc paste or other skin-protecting material, whilst opiates are given freely.

It may even be worth while to produce complete paraplegia by inserting a tenotome between the laminæ of the vertebræ low down, and cutting across the cord; or more surgically, to isolate the nerve-supply to the bladder and sever it.

If the bladder is *not* contracted supra-pubic drainage will relieve the spasm, but not, of course, the nerve pain, which is due to direct compression of these structures by the hard infiltrating growth. It is needless to say that if the ulcer is anywhere near the apex it can be resected with a fair chance of success. An indolent, hard, infiltrating growth is found near the apex, but I have not met with it as an ulcer. I have resected such growths, taking large areas of the entire thickness of the bladder away.

CHAPTER XII.

STONE IN THE BLADDER.

AMONG the educational advantages which electric cystoscopy has conferred upon us is an exact knowledge of the normal and abnormal configuration of the bladder *in life*. This affords us a clue to the manner in which calculi may escape the impact of the beak of a calculus sound. I believe that most candid and experienced surgeons will admit that they have more than once, in the course of their work, had the mortification of learning that some *confrère* has chanced to discover a calculus which they themselves had previously failed to diagnose.

In the course of my investigation of the causes for such negative explorations I have met with patients who have been sounded, under and without ether, in every large general hospital in London—patients who have been assured by the examiner that no stone was present, and yet on examination with the cystoscope I have detected stone, and subsequently removed it by litholapaxy. Further, on more than one occasion I have demonstrated a calculus in the bladder with the cystoscope, so situated that I could not touch it with the sound. I have handed the sound to those present, and they have examined with a similar result. On one such occasion I asked two visitors, each having a record of nearly a thousand litholapaxies, to sound the bladder, and both failed to ring the calculus they could see with the cystoscope.

These statements are not made in any hypercritical or censorious spirit, for I am fully aware I have missed

stones by sounding, which others have afterwards detected. They merely indicate that competent surgeons are liable to fail, and that the subject is worth investigating.

Much has been written on negative exploration for calculus; many pictures have been given in illustration of the causes of failure. These latter have been copied and re-copied from book to book, until they are part of the retinal impressions of every practitioner who takes a sound in hand.

But many of these diagrams, if I may judge them by the light which the cystoscope throws upon the subject, are not altogether accurate; some are even misleading. I venture, therefore, to record certain facts I have noted, and to suggest manœuvres for the more certain detection of stone.

Appearances of Calculi under Electric Light.

Calculi are striking objects when viewed by electric light. Those which have recently entered the bladder from the ureter are either in the form of crystal-covered irregular brownish bodies (the oxalate group), or smooth, and of varied hue, according to the composition of the stone, black-grey (oxalate) or fawn-coloured (uric acid). Those which have been only for a short time in the bladder appear usually as brownish or whitish tuberculated bodies resting on the bladder base, and throwing a dark shadow upon the subjacent reddish mucous membrane. Sometimes, however, the stone or stones are covered with a thick layer of muco-pus, usually grey, but which may be brown or black from deposited altered blood. The angle of incidence of the light alters the colour of a naked stone, a dark stone appearing light, and a lightish stone in shadow appearing dark. Vesical stones of any size have one of two colours, dead white or dark brown.*

* For those appearances which simulate stone, see page 108.

Reasons for the Occasional Failure on the part of Competent Surgeons to Detect a Calculus with a Sound.*

The causes of failure appear to range themselves under the following heads:

1. The burying of small stones between rugæ.
2. The closure of the mouths of certain stress-pouchings.
3. The sandwiching of a calculus between the posterior wall and an upraised prostate.
4. The ledging of stone.
5. The true encystation of a stone.

1. The "Burying of a Small Stone" between Rugæ.

The popular sedative which is administered to the wounded *amour-propre* when one has missed a stone in sounding is the surmise that the stone must have slipped, prior to the examination, into a hernia or saccule of the bladder, and have emerged subsequently. This is soothing but fallacious. Few saccules, even the largest, are of sufficient depth, or have openings large enough † to allow the ingress, the temporary lodgment, and egress of foreign bodies bigger than a monkey-nut, whilst the depth of those usually met with on post-mortem hardly permit the retention of a small pea.

The facts seem to permit of another explanation.

Few realise how soon or how greatly the healthy mucous membrane of the bladder resents an irritating foreign body. It rapidly becomes congested, succulent, and velvety. As the inflammation heightens, the rugæ become more and more exaggerated, the wrinkles fill up,

* The enumeration of well-known urethral and prostatic reasons for this failure have been omitted.

† The actual size of these openings, as estimated on post-mortem, is illusory, for their real breadth depends partly upon the state of contraction of the muscle-bundles encircling their mouths, and upon the degree of congestion of the mucous membrane lining their orifices, both conditions being inappreciable at an autopsy.

the dimples disappear. It is instructive to examine under electric light such a surface in a chronic stage of inflammation, to watch the gelatinous mucous membrane of the postero-superior wall sluggishly and stiffly roll itself in, as the bladder contracts in evacuating its contents through the channelled cystoscope; and it strikes the observer at once how easily small stones could be caught and buried between the approximating swollen folds. How much more readily then could such a stone be thus entrapped if its surface be spiculated or even rough, and if the surgeon is examining the patient upon his back with the bladder only partially filled!

The fold which seems to trap a little stone most readily is the transverse fold, situated nearest and parallel to the posterior edge (base) of the trigone. Buried between these two succulent ridges a small stone can often be seen but not struck, the projecting convexities of the rugæ shielding the stone from the impact. And yet the release of this little calculus is easy; injection of water expands the bladder, the upper fold lifts, and the stone rolls on to the trigone.

Even then another cause of failure may come into play. This is the flotation of small stones. I can quite imagine a small light stone which has just passed from the ureter after an attack of renal colic being missed by the sound. The oscillations of the water made by the sound cause the calculus to shift about like a piece of soap in a bath.

How then can this form of failure be avoided?

Obviously by first reducing the congestion of the folds by rest in bed for two or three days and appropriate medicine; but above all by sounding in a FULL bladder, or, if the sound fails, by using the aspiration-cannula, as proposed by Mr. Freyer.* I can look back on a long series of cases in which I was able not only to detect such a stone with this instrument, but also to remove it then and there, to the great relief of the patient.

* Freyer, 'Indian Medical Gazette,' March, 1884.

2. *The Closure of the Mouths of Shallow Stress-pouchings.*

Now, in reference to larger stones the same swelling of the mucous membrane has to be encountered, but in addition to this there is not infrequently a distinct structural alteration of the bladder contour also present. I must briefly digress to this in order to make my meaning clear. In 1884 I was much impressed by meeting with a case of calculus *in an adult*, in which the symptoms had been rendered *latent* by the lodgment of the stone in a depression of the atonic bladder-wall behind the trigone. I showed the specimen at the Pathological Society * as a rare instance of a post-trigonal pouch, for until I used the cystoscope routinely, and was able to examine many distended bladders, I had no idea that such conditions were common, even in the healthy bladders of young adults.† The post-trigonal depression to which I allude is formed by the bulging backwards of all the tunics of the bladder from over-pressure, or from some long-existing stress upon the "unprotected space" behind the trigone. This part is the "unprotected space" in the bladder, for it intervenes between the trigone, dense in structure, and supported by the prostate, and that part of the posterior wall which is strengthened by the reflection of the tough adherent peritoneum. Such a pouch is represented in Plate X, which has been drawn from the bladder of a man aged thirty-two; *a, b*, are the orifices of the ureters, between them stretch the bold elevation of the inter-ureteric muscles—the inter-ureteric bar—which form the posterior limits or base line of the trigone. Behind the bar is a depression, the post-trigonal

* 'Pathological Transactions,' vol. xxxvii, 1886, p. 303.

† A marked distinction must be made between herniæ or sacculæ, which are produced by the protrusion of the mucous membrane between the interlacings of hypertrophied muscle-bundles and a stressing of the entire bladder wall into a gutter or pouch. The post-prostatic pouches are formed in the latter manner, but are, of course, deepened anteriorly by the upward projection of the intra-vesical outgrowth of the prostate.

PLATE X.



Behind the interureteric bar *a b* lies a deep post-trigonal pouch.
Drawing of the bladder of a man *æ*t. 32.

pouch, which in this instance was formed by the stressing consequent upon stricture. It contained a stone one ounce in weight.

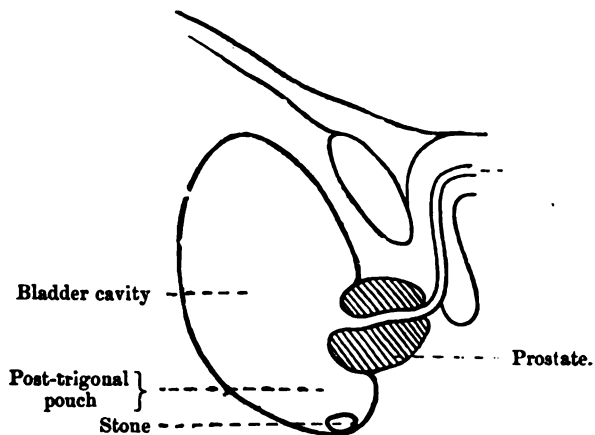
Not only are such pouches to be found behind the trigone, but they occur also, though rarely, at the sides of the trigone.

How would the mucous membrane of the posterior wall, and of the trigone puffed by cystitis, act towards an intervening basal pouch during micturition? By appropriate withdrawal of water the loose and succulent surface can be seen to fall slowly like a drop curtain, until its lowest fold slides down upon the thick fixed edge of the swollen inter-ureteric bar. A gutter-like pouch is thus walled off, and in this a small stone may be buried more or less easily and completely.

I have watched small stones slide and become enwrapped in this way, but this drop-curtain action is more striking when the prostate projects slightly into the bladder in the form of a low collar. In these cases the post-trigonal pouch is much deeper, for the trigone is often also depressed behind the projection. Here are two illustrations selected from a large series.

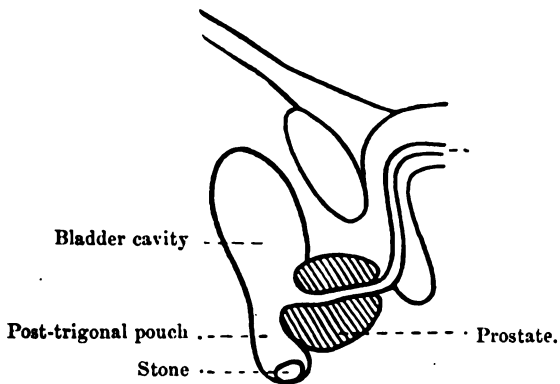
An old gentleman *æt.* 70 was brought to me by Dr. E. Franey, of Banbury. The symptoms pointed rather to growth, but I anticipated calculus because the hæmorrhage was so dependent on exercise or motion. Instead, therefore, of sounding first, I introduced the cystoscope, and on turning the prism over I saw a small, flat, brownish surfaced uratic stone in a post-trigonal depression; a low median collar existed (Fig. 71). As I was examining, a spasm took place and water ran along the urethra by the side of the cystoscope, as it often does in oldish men. Thereupon the mucous membrane of the posterior wall descended and shelved forward, the post-trigonal pouch opening narrowed, and the stone became more and more hidden (Fig. 72). The change reminded me of the tightening of the mouth of an old-fashioned string purse. On redistending with water the pouch opened and the stone reappeared. Had I sounded this bladder with only a small amount of water in the bladder, I should probably have rapped the orifice of the pouch with the sound and the stone would not have been touched.

FIG. 71.



Stone in a post-trigonal depression.

FIG. 72.



Mouth of post-trigonal pouch closing over stone as the bladder empties.

I crushed and evacuated. I saw the patient twelve months afterwards. His urine was sterile, and he was free from any symptoms.

In other cases the stress pouching is found at the side of the base, to the outer side of the ureteric opening, but the mechanism of the closure of its mouth is the same. The succulent mucous membrane rolls over the orifice and narrows it, the calculus becoming more and more covered.

These are the cases which at first produce no characteristic symptoms of stone. They occur often in oldish men, with a low median prostatic collar; the urine is generally very clear and acid. There is usually no history of renal colic, merely that of the passage of cayenne pepper gravel. Suddenly the gravel ceases to appear, the patient congratulates himself and attributes as often as not his recovery to some domestic medicine or patent drug. In a month or two, after a longish walk or jolting drive, the urine becomes discoloured, or even becomes bright with blood. This is the first indication of calculus.

Mr. Z—, æt. 43, kindly sent by Dr. Biggs, of Wandsworth, stated that he had suffered for fifteen months from intermittent attacks of profuse hæmaturia, accompanied by pain and frequency. The intervals of complete freedom from these symptoms varied in duration from four months to a month. He had been very carefully sounded with a negative result. He was suffering from an attack when Dr. Biggs sent him to me for a cystoscopic diagnosis. On examination, the mucous membrane of the bladder was seen to be extremely congested and puffy with œdema. No growth was visible. I was searching the left postero-lateral wall (with 4 oz. distension) when my hand was suddenly arrested by seeing the brown nose of an oxalate of lime calculus deep in the mouth of a stress pouch on the left side of the bladder base, by the left ureteric orifice. The mucous membrane was so gelatinous and upraised around it, and the amount of the stone which lay uncovered was so small, that I appreciated at once the reason for my predecessor's failure in striking it. In fact, to impress the lesson more strongly on myself, I sounded the bladder with 4 oz. distension, and realised that the impact of the beak was warded off from the partially buried stone by the damper-like swollen edge of the orifice of the sac. I now introduced four more ounces (8 oz. distension) and found the stone

lay more uncovered. Directing the tip of the cystoscope straight at the stone I settled the diagnosis with a touch, and found it loose enough for me to hope that I might be able to lift it out of its bed by a happy grasp with the lithotrite. The patient was told to rest and take a three weeks' course of sandal oil in order to reduce the inflammatory swelling. At the end of this time, although our patient assured us he felt quite recovered, I proceeded to operate.

I first demonstrated (with 6 oz. distension) the sac and its containing stone to those present. Everything had changed its appearance. The congestion and œdema had disappeared, the thickened rugæ had flattened down, the surface was now of a straw colour, and the vessels were diminished in number and size. The edge of the pouch was thin and sharp, not thick and turgid as I had previously seen it. Obviously it had also receded, for the stone was much more uncovered. I now introduced the lithotrite, seized the stone and dragged it from its bed and crushed it (weight 101 grains). Curious to ascertain the cause of its fixation, I washed out the bladder, after evacuating the fragments, and re-introduced the cystoscope. The pouch was empty, but all of us could plainly see that its interior was lined with brownish furry mould, whilst on its roof or upper concavity a scale of the crust of the calculus still remained attached to the pouch wall as an evidence of the adherence of the parent body. Knowing how rapid a reconstruction would take place upon this shell as a nucleus in this trap-like recess, I passed a child's lithotrite, directed its beak into the pouch, opened it, caught the shell, and withdrew it, complete but crushed, between the blade of the instrument. The patient made an excellent and rapid recovery.

3. *Saddle Calculi.*

A calculus may become sandwiched between an up-raised collar or median lobe of the enlarged prostate and a thick muscular posterior wall. Here there is not really a post-prostatic pouch, as is generally supposed, but a sharp-angled gutter which is formed between the posterior wall of the bladder and the posterior surface of the enlarged median lobe. In every case this stone is a "dirt" stone, that is, it is composed of phosphates deposited on the débris or dirt which collects in the uncleansed gutter. Some stones I have removed are so moulded to the bladder wall and prostate as to resemble

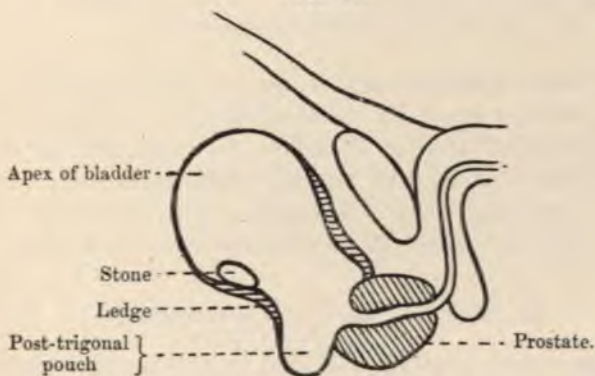
a nux vomica bean, biconcave in shape. They can be seen with the cystoscope, but often cannot be touched by a sound. They usually need supra-pubic lithotomy.

4. "Ledged" Stones.

Certain bladders are naturally rather like an hour-glass in shape, even in young men. This is due, I believe, to an excessive development of the circular muscle tunic about the junction of the middle and lower third. Any way, on post-mortem the muscle layer at this part is unusually thick, and a distinct transverse shelf or ridge of mucous membrane marks the position of the well-developed layer. This condition is exaggerated in older bladders, especially if there has been obstruction to the outflow of urine, and a stone sometimes rests on this ledge.

I have attempted to reproduce in a diagram, Fig. 73,

FIG. 73.



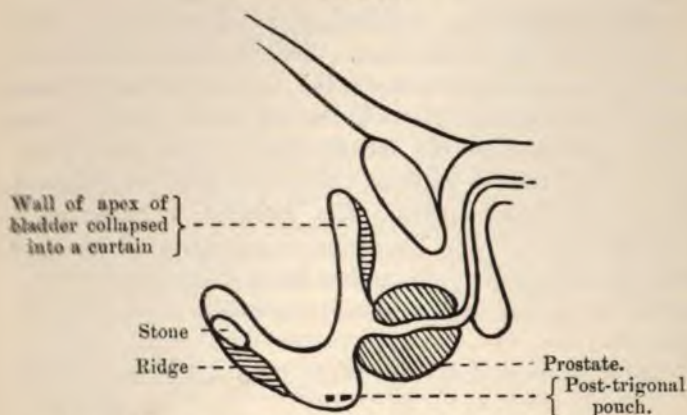
Hour-glass bladder. Thick ridge on posterior wall, with stone resting on the ledge formed by the constriction.

the appearance of a stone resting on this ridge, and the fall of the postero-superior wall over it when the water was allowed to flow out.

If the reader will grasp an inflated india-rubber ball about the centre, and then allow the air to escape, he

will realise the ease with which the upper end of the hour-glass can curtain over and separate the upper compartment from the lower (Fig. 74).

FIG. 74.



Ledged stone in a half-filled bladder. For sake of clearness the capacity of the bladder has been increased.

The lower compartment of an hour-glass bladder in actual practice is easily sounded, but if the bladder is only slightly full the sound strikes the ridge and the soft roof of mucous membrane and the stone is missed. The lesson to be learnt here is the same. The bladder should be full when an examination with the sound is made.

5. *True Encystation of a Calculus.*

To meet with a stone encysted in the bladder wall is rare. It is common enough to hear of such a diagnosis, but if I may judge from an experience of fifteen years' work in all forms of surgical urinary disease, the true encysted form is but seldom encountered.

The stone starts generally as a *small* pure renal calculus, which becomes lodged in a deep dimple or a small stress diverticulum. This would seem to happen easiest in a half-distended condition of the bladder, for then the

orifice of the little sacculæ is open and relaxed. Once in, it runs a great chance of imprisonment, for it excites in the sacculæ a localised cystitis and its bulk rapidly increases from deposition of earthy phosphates, until it is larger than the orifice through which it has slipped.

The sac now enlarges by increasing growth of the stone, so that its size is in proportion to the stone. The following facts may be accepted as axioms.

1. The sac which is always outside the muscle tunic communicates with the interior of the bladder by a narrow orifice, which is often very small.

2. The sac is invariably filled *exactly* by the stone.

3. The major part of a large encysted stone is made up of phosphatic material.

4. It can always be diagnosed if large by rectal examination.

5. The stone surface may remain level with the orifice or grow into the bladder to form a dumb-bell calculus.

At first it generally is symptomless, but may, after severe jolting, excite localised cystitis in the immediate neighbourhood of the sac. The symptoms evoked are, however, slight and transient.

In the *early* life history of such a stone the cystoscope is of the greatest use, not only as regards diagnosis, but also as indicating the best route for its removal.

The following case, which I published in 1893,* and which I subsequently followed to its unfortunate sequel in 1896, illustrates not only the value of the light, but the necessity for early intervention.

A. P—, æt. 28, consulted me in May, 1892. Three years ago, being then in perfect health, and never having had any urinary disease or trouble, he jumped off an omnibus whilst it was in motion, and came with an unexpectedly sudden jerk upon his feet. He immediately felt a severe pain in the crutch, but by putting his finger on to the perinæum and pressing upwards he gained relief enough to walk home. The pain continuing, his doctor sent him to a London hospital, and the surgeon under whose care he was admitted skilfully crushed a calculus weighing 368 grains.

* Author, 'Cardinal Symptoms of Urinary Disease,' p. 218.

Fourteen days after the operation he began to be troubled with left renal colic, and since then he has had repeated attacks. Pain, not apparently of a severe character, started in the left kidney, and coursed along the left ureter to the left testicle, which was drawn up. The attacks were very short in duration, and occurred once a day.

Cystoscopy (May, 1892).—In order to ascertain the condition of the left ureter preparatory to performing nephrolithotomy, I introduced the electric cystoscope, and found the entire surface of the bladder in a state of subacute cystitis. After thorough washing "I saw something which puzzled me greatly. Protruding and retracting from a small hole in the left side of the bladder above the left ureteric orifice was a brown spike. I noticed it moved with respiration. At first I felt certain it was a stone sticking in the mouth of the ureter, and this impaction would explain the presence of renal colic, and the absence of bladder symptoms. On introducing my finger into the rectum and examining the posterior surface of the bladder, I felt high up on the left side a small stony-hard body in a sac, and knew at once the spike I had been looking at was the nose of a small encysted stone. The left ureteric orifice was free."

"From the date of this cystoscopy and the thorough vesical irrigation necessary for that procedure, the patient was absolutely free from all symptoms of renal colic. He alleged himself to be cured and would not be operated on. He reported himself to me every year, and I always examined the encysted stone through the rectum. I was inclined to believe that its weight had pressed upon and slightly occluded the left ureteric orifice, the narrowing being increased by the swelling of the subacute cystitis, and that washing and sandal oil, by curing the inflammation, had removed the partial obstruction." (From 'Cardinal Symptoms,' page 218.)

Sequel (obtained since publication of above).—This patient wrote to me on July 26th, 1895, stating that he had been well up to fourteen days ago; he then had severe left renal pain and vomiting, and the urine became milky. I found him puffy under the eyelids; his urine stank; it contained pyelitic pus, s. g. 1010, 1·1 per cent. of urea. *Per rectum* a large hard swelling could be felt high up on the left posterior wall. The stone had evidently increased greatly in size. On supra-pubic cystotomy the mucous membrane was smooth. I could feel no stone nor any orifice to a diverticulum, though a hard mass evidently occupied the tissues of the left wall. Finally I touched a nipple-like projection, and in it found a hole which admitted a knitting-needle. A probe passed through struck a phosphatic stone in a diverticulum.

I enlarged this tiny orifice and laid bare a large phosphatic

calculus, two ounces in weight, which, with much manipulation and tearing, I removed. The nucleus was found to be a small oxalate of lime calculus weighing about half a drachm. The patient died in a week. The left kidney was crammed with calculi.

Had I operated in 1892, when I first discovered this stone with the cystoscope, I should have saved this patient, but I did not realise how rapidly stones in **sacculi** increase in size, and I did not therefore urge the operation upon the patient. The fatality was in a large measure due to the manipulation and tearing necessary to extract the stone, for I had not an osteotome or chisel with me such as I now always use to break up encysted calculi, and thus save damage to the bladder in the neighbourhood of the sac. Although this operative procedure is not of interest cystoscopically, it is of such practical value in connection with advanced cases—those which have not been discovered early—that I venture to allude to it and to give my earliest and my latest cases as illustrations of its employment.

A case of supra-pubic lithotomy for encysted calculus of large size; successful removal by means of the chisel and mallet.—C. D—, æt. 44. Kindly sent to me by Dr. Leonard Hine, of Leytonstone. The patient states that he was quite healthy up to 1880, when he noticed a white sediment appear in his urine. At the same time he experienced pain along the urethra on micturition. He describes his urine as gradually thickening, so that it could be turned bodily out of the pot. It was of a dark brownish colour and very offensive. He passed it without difficulty or straining.*

The muco-pus eventually became replaced by a white sediment, which on being examined microscopically was pronounced to be composed of triple phosphatic crystals. This sediment gradually took the form of fine white sand. By degrees the particles increased in size until they formed pea-sized stones. One of these latter got impacted in the penile urethra, and was broken and removed by the patient himself by means of a pair of fine pliers. Under the continuous exhibition of acid medicines, however, his urine finally cleared, and he remained apparently free from any further trouble for three years. In 1887 he began to experience a sharp pain in the crutch, which was increased by walking. There was no pain in

* 'Clin. Soc. Trans.,' vol. xxii.

micturition, but the appearance of the urine varied; sometimes it was clear, at other times it contained much floating material and sediment. In August, 1887, he complained to Dr. Hine of pain during micturition in the perinaeum and all along the urethra. There was no frequency. He did not rise at night to urinate.

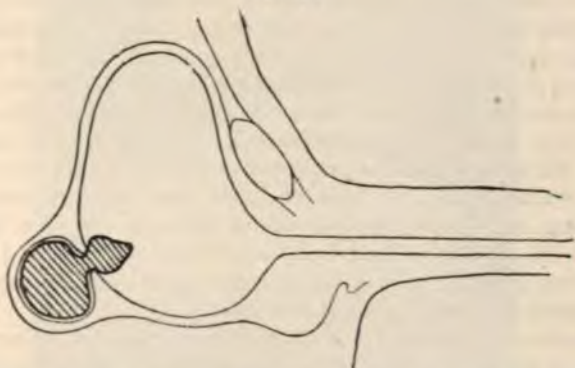
Towards October, 1887, frequency of micturition, both in the day and at night, appeared. In January, 1888, he found himself forced to strain in order to make water. The pain increased, the urine became decidedly murky, and deposited a good deal of pus. He was sounded, but no stone was detected. Vesical irrigation was performed, but the procedure increased rather than relieved his trouble, and large pieces of mucous membrane were said to have been passed after the washing out. He came under my care on June 2nd, 1888. He was then suffering from constant supra-pubic and perineal pain, also an occasional pain at the glans penis. His stream of water had but little force in it. It never stopped abruptly. There had been no blood observed. At the end of micturition he used to be seized with a violent fit of straining, but there was no faecal incontinence or rectal prolapse. His urine was alkaline; it contained pus and phosphatic *débris*. On sounding him I found a small soft stone far back in the bladder, and on June 7th I introduced a lithotrite and attempted to crush it. I found myself unable to open the instrument more than an inch or two, nor could I insinuate the female blade between the stone and the posterior wall of the bladder. On examining *per rectum* to ascertain the cause of the difficulty, I found a large stony mass, $2\frac{1}{2}$ inches in length by $2\frac{1}{4}$ inches in breadth, along the right wall of the bladder, pressing back into and partially occluding the rectum. I had no difficulty in recognising this stony mass as a calculus encysted behind the prostate, for a similar hard mass was found in one of my out-patients, from whom my colleague, Mr. Rivington, removed supra-pubically a calculus of one and a half pounds in weight.*

I postponed the operation to obtain permission to perform lithotomy. Although I had used no force whatever with the lithotrite, a very grave reaction with collapse ensued. The patient recovered quickly, however, and on June 12th, a week after, I performed supra-pubic cystotomy in the usual way, with this exception, that instead of injecting boracic acid solution into the bladder I distended it with half a pint of warm oil. For in the operation of Mr. Rivington's, to which I have just alluded, and in which I had the privilege of assisting, I had noticed that the fragments and *débris* of the crushed stone adhered with the greatest tenacity, both

* W. Rivington, 'Trans. Roy. Med.-Chir. Soc.,' 1886, vol. lxi, p. 360.

in piece and in powder, to the mucous membrane of the bladder and to the surface of the wound. This I hoped the oil would prevent, and I was not disappointed. On introducing my finger into the bladder a rough pointed stone was felt *fixed* in the left lower angle of the viscus. Slight pressure snapped it from its stalk, and on extraction it was found to be conical (obtruncated). It weighed one and a half ounces. On re-introducing the finger to ascertain the cause for its fixation, the sharp, tooth-like projection of its broken neck was detected springing from the narrow opening of a diverticulum placed near the orifice of the left ureter. The opening tightly gripped the stalk or neck of the stone (Fig. 75). It was therefore

FIG. 75.



Dumb-bell encysted stone of C. D—, showing the neck grasped by the narrow orifice of the diverticulum.

cautiously dilated by means of the forefinger until its size was equal to a two-shilling or half-crown piece. The forefinger now found itself inside a large sac or diverticulum, which was almost filled by a smooth oval stone.

The thin-walled sac was felt to be bounded in front by the prostate, above by the pushed-up pouch of peritoneum in the recto-vesical space, behind by the rectum. It extended more to the right than to the left. It was obviously dangerous to further enlarge its orifice for fear of tearing the bladder wall and thus of opening up the peritoneal cavity. The stone was far too large to be extracted whole, and it was so situated as to be inaccessible to the lithotrite or crushing forceps. Remembering Mr. Rivington's expedient,* I took a broad osteotomy chisel, passed it through the

* *Supra cit.*

supra-pubic wound, and guided it through the orifice of the sac until its cutting edge rested on the stone; then, getting elastic counter-pressure in the rectum by means of a Petersen's bag, I proceeded to cut through the calculus in one diameter by repeated blows of a heavy mallet. Working cautiously as I felt the resistance lessen, I was able by this means to split the calculus in one diameter without cutting into the saccular wall. I now rotated the bisected calculus by means of my forefinger, so as to bring a fresh surface of one of the halves immediately under the mouth of the sac. This was cut through in a similar way. By taking each half in turn and repeating the proceeding I was able to split the stone into sections sufficiently small to allow of their extraction through the narrow mouth of the diverticulum. These fragments were subsequently weighed, and, without counting what was lost in the washings, they amounted to four and a half ounces. The bladder was washed out, and a large drainage-tube was passed through the supra-pubic wound to the bottom of the diverticulum. A boutonnière afforded counter-drainage.

The subsequent history of the case is without interest. There was no reaction nor any rise of temperature. The urine rapidly became clear. On July 6th the supra-pubic wound healed (in little over three weeks). On July 17th the tube was removed from the perinæum, and the supra-pubic wound reopened the same night; catheterism caused its final closure two days after. The patient left for the country in six weeks after the operation. I heard of his good health for several years in succession.

Description of stone.—The fragments were pieced together with plaster of Paris (Plate XI). The stone was dumb-bell in shape, and composed of phosphate of lime. The vesical and smaller part weighed one and a half ounces, the diverticular and larger portion four and a half ounces. The circumference of the former was five inches and of the latter seven inches along their broadest parts.

My most recent case is as follows :

Supra-pubic lithotomy for encysted calculus; removal after section with chisel and mallet.—A gentleman who had been troubled for five years with symptoms of chronic cystitis, and had been sounded by various London surgeons, consulted me in March, 1900. On examining *per rectum*, I detected high up on the right postero-lateral wall an encysted calculus of large size (Fig. 76). Before proceeding to supra-pubic cystotomy I examined with the cystoscope. I could see no trace of the orifice of the diverticulum, but the mucous membrane was succulent, œdematous over the site of the diverticulum, and its appearance and colour were precisely like that of a

PLATE XI.



Encysted stone from C. D—, 6 oz. in weight; the larger part lay in a diverticulum, the smaller part projected into the bladder. (Actual size.)

PLATE XIa.

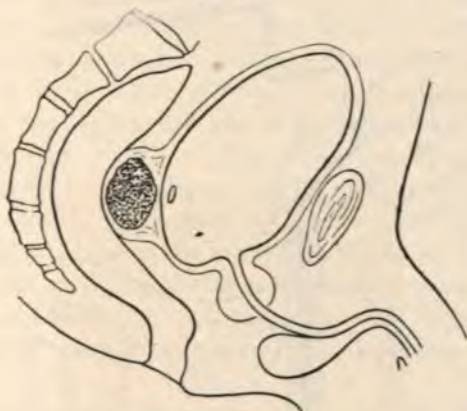


Caisson view of the red rolled orifice of a diverticulum and the dead white phosphated stone in the centre almost level with opening.

Bale & Danielsson, Ltd., Lith.

prolapsed anus. The rest of the bladder was healthy. After opening the bladder supra-pubically I introduced my finger, but I felt no stone nor any hole. It was not until my colleague, who assisted me, had thrust up the calculus by means of his fingers in the rectum that I discovered a small threepenny-piece sized opening. The tip

FIG. 76.

Eucysted stone felt *per rectum*.

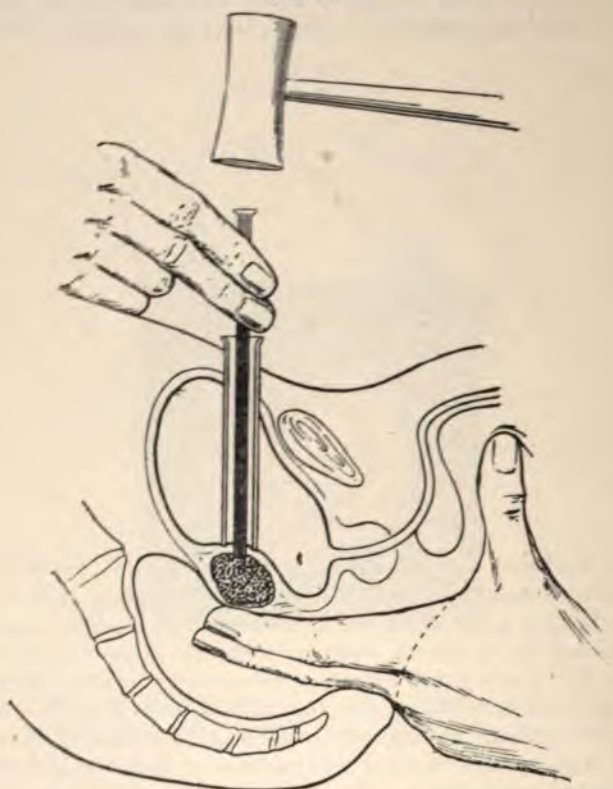
of my forefinger introduced into the mouth of this touched [the surface of a smooth phosphatic stone. I ran a caisson on to it and threw a light upon the surface. A dead white surface appeared surrounded by a rim of swollen, reddened mucous membrane (Plate XI ^A I now placed a blunt chisel on it and cut it into sections (Fig. 77), and extracted it piecemeal, without much damage or tearing of the orifice. It weighed two and a half ounces, and was composed of phosphates on a uric acid nucleus. A drain was laid in the bladder and one in the sac; the patient was healed soundly at the end of the third week, and continued for some time free of all symptoms. This result was promised him on the experience gained in similar cases in the exact use of the chisel and mallet. He has lately (March, 1901) had attacks of cystitis.

Fragments of Stone left in the Bladder after Litholapaxy.

One of the opprobria of surgery—to use a favourite expression—is the incomplete evacuation of the fragments of a stone crushed by litholapaxy. As a rule I make a

point of examining every bladder after litholapaxy with the cystoscope, and especially attempt this when much

FIG. 77.



Vulcanite caisson passed through supra-pubic wound, and lodged under guidance of head lamp over orifice of diverticulum. Chisel passed, under control of eye, along caisson exactly on to stone; fingers in rectum for counter-pressure.

atony is present. I believe in rare instances it is impossible to evacuate the bladder thoroughly. I have had practical demonstration, both in private and hospital life, of fragments being left by those who may be justly styled as master hands.*

* Three lithotritists of the first rank—each having an experience, I believe,

The Causes for Fragments being left.

This unfortunate accident—for such it can only be termed—occurs under quite a variety of conditions.

(a) *Fragments in pouches or depressions.*—This seems to me a very fruitful cause for incomplete litholapaxy. Often when I have considered the operation done, I have washed out and examined with the cystoscope, and found a fragment or so in the recesses near the trigone. The fragments most often left are of the phosphatic type.

(b) *Adherent shell or crust.*—In certain phosphatic stones which have become partly adherent in a low gutter or pouch (*vide* page 228), the shell may be left behind still attached to the mucous membrane. It neither reacts to the suction apparatus nor does it give any click with the sound, for as often as not the impact of the instrument is warded off by the swollen mucous membrane around.

Every phosphatic stone has a nest or bed, and this by the irritation of the calculus is “lined” with a protective layer of mucus, pus, and *débris*. The lining is often very tenacious, and to it fragments frequently adhere. The litholapacist will not be content until this white, sloughy-looking membrane, with its particles of phosphatic material, is evacuated. I am convinced some cases at least of recurrent stone in old men are due to redeposition upon an unstripped “bed.”

(c) Blood-clot not infrequently surrounds or buries small fragments, and no click is obtained with the evacuator—even a considerable piece may then be left behind. The cystoscope shows the blood-clot. Personally I never like leaving a clot in the bladder after litholapaxy, and am not content until it is removed by suction. The only precautionary measure which can be taken against this is to mix a hæmostatic with the water in the evacuator,

of 800 to 1000 calculi—have to my knowledge left fragments which I or a *confrère* have subsequently removed, either by post-mortem or by the lithotrite.

for some old prostates bleed very freely. It will be generally found that if stones cause an unusual amount of hæmorrhage before litholapaxy, this slight difficulty will arise during the operation of crushing.

(d) *Atony*.—Incomplete operations seem to me to be sometimes due to a loss of the elastic reaction of the bladder; at each back rush into the ball the flabby, toneless wall flops on to the eye of the catheter and blocks the crowd of fragments which are being sucked out.

This parietic condition generally occurs in those who have been on catheter life for years, but it may happen (though rarely) in the middle-aged when the anæsthesia is profound. A glance at the anus often affords us a hint, for it will be found relaxed and the orifice patulous if the anæsthesia is causing paresis. When I find this occur I get the anæsthetist to withhold the anæsthetic for a time.

The absolutely atonic "old" bladder is one of the greatest difficulties the litholapacist has to deal with. On several occasions I have seen fragments I could neither suck out nor yet seize. In these cases and in these alone I content myself with a double sitting, nor do the patients suffer much in consequence, for they are dependent on their catheter and accustomed to vesical irrigation.

(e) *Rare causes*.—It is conceivable that a wide open ureteric orifice and dilated ureter may permit fragments to enter. I mention this on the strength of a single case which I was asked to examine post mortem. An operating surgeon had performed litholapaxy, and the patient had died on the third day after. I was not present at the operation, but I heard that much trouble was encountered in evacuating the fragments. I found the entire right ureter and right renal pelvis dilated and powdered with phosphatic *débris* and fragments which had evidently been washed up from the bladder. In another (a female) case, which an hospital pathologist was examining when I chanced to be present, the posterior wall had been split subperitoneally, and the

fragments had been forced along a subperitoneal track, which could be traced as high as the apex of the viscus. I learnt that the patient was very old and feeble when operated on.

Summing up briefly :—The practical lessons for sounding and litholapaxy as taught by visual examination are as follows :

1. Never sound during an attack of stone.
2. Reduce inflammatory swelling previous to sounding by a few days' rest in bed and appropriate medicine.
3. Sound in every position of the body (even in complete inversion in children) and with every degree of distension and contraction of the bladder. If a recent attack of colic has been noticed apply suction.
4. Fully distend the bladder in order to examine the basal pouches with the sound.
5. When the symptoms of stone are obvious, and suction, sound, and lithotrite have failed, wait a week and have the patient cystoscoped.
6. Never fail to examine the base of bladder *per rectum* to eliminate encysted stone.
7. After litholapaxy examine with the cystoscope if possible to make sure no fragments have been left in post-trigonal recesses.

CHAPTER XIII.

TUMOURS OF THE URINARY BLADDER; POINTS IN THE TECHNIQUE OF THEIR CYSTOSCOPY.*

PERHAPS in no other disease of the urinary tract has the electric cystoscope proved of such signal service as in the exact study of tumours of the bladder. Certainly in no other disease of the bladder has the method been of such uniform value, for by its means the diagnosis has become a certainty, the prognosis has been rendered accurate, and the operative interference has been guided on to purposive and judicious lines.

It would be wise, however, before the subject is considered in its various clinical aspects, to follow the plan hitherto adhered to in this book of noting the difficulties and dangers which are met with in thus examining a bladder affected by neoplastic changes.

But first a few rules of technique.

RULES FOR THE EXAMINATION OF TUMOURS OF THE BLADDER.

RULE 1: ALWAYS CYSTOSCOPE, NEVER SOUND FOR SYMPTOMLESS HÆMATURIA. "Symptomless" hæmaturia† is the symptom which should raise a suspicion of growth of the bladder. This sharply-defined symptom, when it is present *alone*, demands the employment of the electric-

* This and the following chapters are based on a personal experience and examination—clinical, cystoscopic, operative, and museum—of 500 cases of growth in the urinary bladder.

† "Symptomless" hæmaturia may be defined as an intermittent hæmorrhage in the urine, extending over a period of months or years, unaccompanied by any other symptom, such as pain (renal or vesical), or frequency of micturition.

light cystoscope. No other instrumental interference should be tolerated. For a practitioner to sound the bladder of a patient merely suffering from this single symptom, or to wash out that viscus, is worse than useless; it is often positively detrimental to the future physical well-being of the patient (compare page 250).

RULE 2: A GENTLE RECTAL EXAMINATION SHOULD BE THE FIRST STEP IN THE INQUIRY. A judicious cystoscopist, when summoned to a patient suffering from symptomless hæmaturia, will first gently examine the posterior wall of the bladder by introducing his finger into the rectum. Any pronounced circumscribed interstitial hardness of the posterior wall in patients suffering from symptomless hæmaturia renders a cystoscopy unnecessary, for the disease is probably infiltrating epithelioma, and in a few months cystitis will develop spontaneously.

French authorities state that all growths of the bladder can be detected by the finger in the rectum and the hand on the pubes. The practitioner must not expect to be able to diagnose vesical tumours so easily. The small benign papilloma is often very difficult to detect even with the finger *in* the bladder, whilst bimanual examination for such, unless of marked size, is always uncertain and illusory. Even a harder, firmer growth, such as a large walnut-sized, non-infiltrating, villous-covered epithelioma affecting the mucous membrane only, if it be situated on any wall but the posterior wall, low down, is generally indiscoverable on bimanual examination.

RULE 3: DARK HÆMATURIAS WITHOUT CLOTS RARELY NEED ANY PREPARATORY WASHING OUT FOR CLEAR CYSTOSCOPY; A DIURETIC OFTEN SUFFICES. The patient is put to rest for a day or two and takes Contrexville or Vittel water abundantly (*vide* p. 62), and the cystoscopist can then examine the bladder in the natural medium without danger to the patient and without the necessity for an immediate operation (cf. Rule 4).

RULE 4 : ALWAYS CYSTOSCOPE AND OPERATE, IF NECESSARY, AT THE SAME SITTING IF THE BLADDER HAS TO BE WASHED OUT. Should the hæmaturia be profuse and mixed with clots it will be necessary to wash out the bladder prior to examination, and under such circumstances it is distinctly advisable to be prepared to operate supra-pubically then and there, for by so doing the wound will heal more rapidly. If operation is not permitted, and a diagnosis is insisted upon, less danger will be incurred if urotropine gr. v freely diluted is administered thrice a day for a few days prior to the examination, and if the bladder is washed out after it with a weak solution of silver nitrate, gr. j in 10 oz. of distilled water.

DIFFICULTIES IN THE CYSTOSCOPY OF TUMOURS OF THE BLADDER.

(a) *Hæmorrhage from Over-distension.*—There is a “psychological moment,” if I may use such a term, for examining the patient who has been drinking Contrexville water in order to ensure a full bladder of clear urine for examination. If the bladder is allowed to get too full, the overstretching causes slight rupture of the base of a growth, especially if it be epitheliomatous, and the hæmorrhage which ensues renders an examination futile. The best time to select is when the patient feels he is “full” and ready to urinate. The same remark, of course, holds for over-distension of the bladder in washing out that viscus prior to a cystoscopy.

(b) *Hæmorrhage from Abrasions of the Growth by Instruments.**—The utmost gentleness has, of course, to

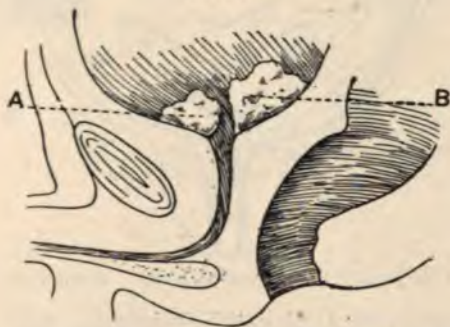
* It is a mistake to suppose that the calculus sound must necessarily produce bleeding from a vesical growth, even if it be used roughly. There are some dense papillomata of the bladder which do not bleed. Some time ago I obtained a good case on this false premise.

G. P—, æt. 27 (under Dr. Arthur Codd, of Bromley). This case was sounded twice under ether in a general hospital for symptomless hæmaturia. No hæmorrhage followed the examination, and yet any vehicle or train jolting induced hæmorrhage. The surgeon inferred on these grounds that a

be exercised with both catheter and cystoscope to avoid abrasions of the growth and a consequent hæmorrhage during the examination. A silk or soft rubber velvet-eyed catheter is the best form of instrument to use for washing. This should be passed so that the eye lies just within the orifice of the bladder. As regards the cystoscope, it must be introduced slowly, and the beak must be kept in the centre of the bladder.

The cases which will baffle the cystoscopist are those in which hard growth surrounds or abuts on the orifice of the bladder (Figs. 78, 79). These usually bleed furiously

FIG. 78.

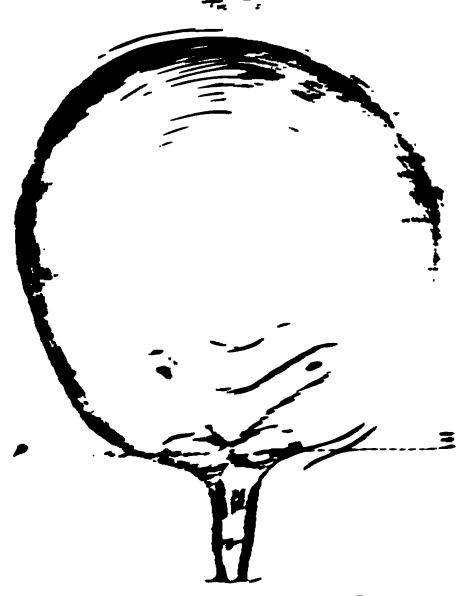


A, B, growth around vesical orifice. Side view.

on the mere passage of any instrument. They render the cystoscope useless, and their diagnosis will generally have to be made by digital exploration through a suprapubic incision. Luckily they are uncommon.

Another cause of difficulty consists in a prolonged hæmorrhage in a feeble anæmic patient. Large black clots are liable to accumulate in the bladder under such conditions, and although the medium returns clear, or nearly clear, during washing, the cystoscopic view is obscured, because the base is covered by layers of buff or vesical papilloma could not be present, and the patient was subsequently sent to me. I removed a large, many-lobed growth of the benign type. It hung on a short pedicle from the right ureteric area. Recovery.

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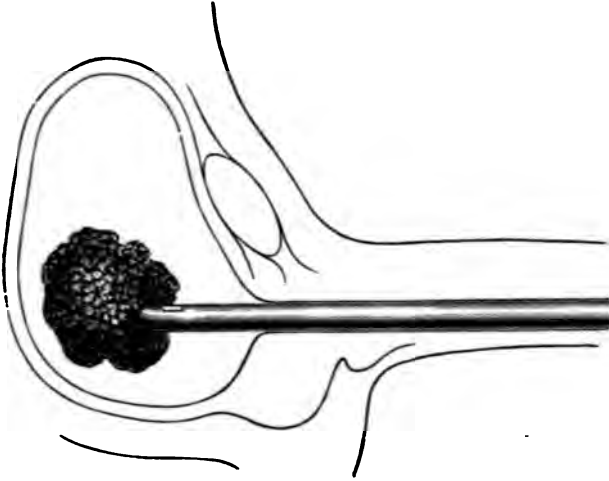
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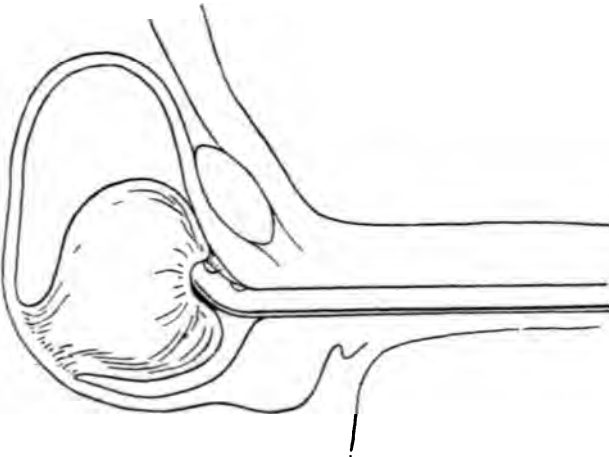
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FIG. 80.



Case of A. L.— Lamp plunged into a papilloma which, when removed, filled a 6-oz. glass measure.

FIG. 81.



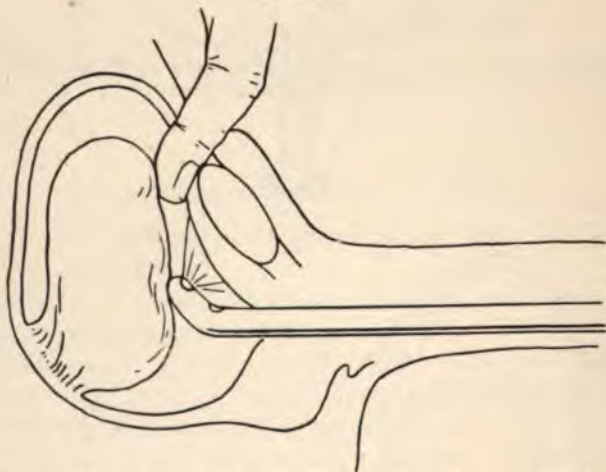
Attempted cystoscopy of Rev. R. B.— Light obscured; cystoscope not rotatable.

growth, filling a twelve-ounce measure, I was equally at fault.

Again, the cystoscopist may fail altogether when examining a bladder occupied by a large, projecting, turnip-like, epitheliomatous growth, for it is impossible to manipulate any instrument in the narrow space left by the encroachment of a large firm tumour (Fig. 81).

I have met with several such, the volume of the growth being usually the size of a large fist. In each case I have had to resort to supra-pubic cystotomy for a diagnosis, but in each I have successfully removed the mass. Fig. 81 represents such a case occurring in June, 1897. I performed supra-pubic cystotomy, and lifted up the tumour with my forefinger (Fig. 82). After lifting

FIG. 82.



Supra-pubic cystotomy. Rev. R. B.—. Fist-sized tumour lifted up with forefinger. Cystoscope still valueless.

up the mass, which equalled a man's closed fist, I found that I could introduce the cystoscope more easily, but that it was quite useless, because its rotatory action was curtailed. I removed the tumour. The patient is reported to be in excellent health (October, 1900).

(d) *Difficulty in washing out the Bladder.*—Occasionally in cases of large fleecy papillomata the eye of the catheter will get blocked with the growth, and the medium cannot be removed. In such a case let the patient be turned on to the side, and the eye of the catheter disengaged and directed towards that side of the bladder which is uppermost. The growth gravitates down, and the washing can then be proceeded with if the eye of the catheter is kept up.

(e) *Difficulty in ascertaining the Site of the Base of a Tumour possessing a Pedicle.*—This is a small matter and of no practical moment, but it may puzzle a cystoscopist to see a villous papilloma lying on the right side of the bladder, and on supra-pubic cystotomy to feel it springing from the left, or *vice versa*. It should be remembered that long-pedicled growths often have a wide range of movement in the bladder, and that the tumour changes its position by gravity.

Advantage is taken of this fact when formulating a prognosis, for the sessility or the pedunculation of tumours can be ascertained by varying the position of the patient; sometimes even the depth of the penetration of the growth into the submucous layers can be roughly estimated by the same means, but this is usually difficult.

Again, it is to be especially remembered that a heavy growth from the posterior or superior wall always drops downwards, and *appears* as if it sprang from the anterior wall, or in some cases from the posterior wall low down. An anterior wall growth is extremely rarely met with. The descriptions of such, which are not infrequent in the literature, are obvious inaccuracies, for such positions are not noticed in museum specimens. I have only met with one case in 135 operations. Moreover, apical growths are only met with in 3 per cent. of all cases.

(f) *Difficulty in determining the Character of the Base of the Villus-covered Growth for Prognostic Purposes.*—The novice will hardly arrive at an accurate conclusion as to the character of the base of a villus-covered growth; not

even a skilled cystoscopist can boast himself to be free from mistake. Those characters which point to a benign nature are tenuity of the pedicle, the presence of long, luxuriant villous processes,* freedom of the base from satellite splashes, and absence of small, clear, grape-like glands at the edge of a sessile growth.

DANGERS IN THE CYSTOSCOPY OF TUMOURS OF THE BLADDER.

An element of danger is at once imported into the case by the introduction into the bladder of any medium in the form of a wash,† no matter whether the medium used be sterilised or not. In every case of bladder growth without exception there is some ureteric change, which may be either of an inflammatory nature or mere atony, or both. It is more or less pronounced according to the duration of the symptoms and the drag on or irritation of the mouth of the ureter by the tumour. Washing out the bladder causes slight surface necrosis of the base, which may infect the unhealthy ureter, and thus a slight risk of a wave of pyelonephritis of one side is incurred. This is the reason why I urgently advise that all patients should, if possible, be examined only when the hæmorrhage has cleared off, and that the urine, naturally

* I need hardly caution cystoscopists against mistaking the necrotic shreddy pieces which peel off a disintegrating carcinoma for pure villous processes.

† Examples taken at random from note-book :

CASE 44.—A cystoscopy was proposed by a surgeon in the provinces to this patient. Tap water was introduced as a wash. A severe attack of cystitis ensued, which kept the patient in bed five weeks. He suffered great pain, and subsequently had an abscess which burst into the rectum.

CASE 47.—A gentleman consulted a gynecologist in London for irritable bladder, and was diagnosed to have stone, whereupon ether was given in this gentleman's consulting-room, and the bladder washed out with an evacuator. On recovering from the anæsthesia he was told that a stone had been removed, and he was sent home in a cab. He lay in bed six weeks, slowly recovering from the ensuing cystitis. On cystoscopy I saw a large fig-sized villous papilloma, pedicled in the right ureteric area ; I removed it suprapubically.

accumulated in the bladder, should be utilised as a medium. Operating surgeons do not sufficiently grasp this danger. They are content that their patients should heal and leave their care apparently well. They are oblivious to the insidious slight pyelitis which many are suffering from when they are reported as "cured." When a patient dies a few months subsequent to the supra-pubic removal of an apparently benign growth, the untoward event is usually considered to be due to malignant disease rather than to the often preventable suppurative nephritis.

The following case, which I was permitted to watch, illustrates this :

H. M—, æt. 50. This patient had suffered from recurrent attacks of symptomless hæmaturia for four years. He had no lower urinary pain, but for three or four months before coming under the care of the surgeon he had had *pain in the left loin and back*; no tenderness in either kidney. Urine sp. gr. 1018; no pus, no casts. Urine clear. On September 23rd the patient was cystoscoped by Mr. X—, and a pedicled villous papilloma seen at the *left ureteric area*. The temperature rose and oscillated between 98.6° and 100°. The growth was removed supra-pubically, October 26th. He healed in due course and returned home. A month later he was seized with obvious symptoms of left renal suppuration. The operator refused to interfere, and diagnosed that the left kidney had become cancerous. The patient died uræmic four months after the operation.

Especial care in obtaining aseptic cystoscopy in patients with symptoms of vesical growth is imperative in the three following groups :

1. In patients who experience an impediment to micturition.

2. In patients with unilateral renal pain.

3. In patients the subject of soft, easily bleeding epitheliomata, when such are complicated by pronounced pyelitis.

1. When a growth falls on to the urethral orifice, or narrows it, there is always more or less residual urine

present, and dilatation of one, if not of both ureters, by back pressure gradually ensues. Slight cystitis may be induced by the washing, and a wave of inflammation may rapidly ascend to one or both kidneys. The cystoscopist will therefore do well to be chary of examining any patient with symptomless hæmaturia who complains of the stream becoming abruptly but painlessly "blocked" before the bladder is emptied, or of having to strain to make a stream in urination. I make an absolute rule in all such cases to be prepared to examine and to operate at one and the same sitting.

2. Unilateral renal pain denotes one-sided dilatation of the ureter and pelvis, and often slight catarrh in addition (*vide* page 268). A clinical note of warning is thus sounded for aseptic and gentle cystoscopy.

3. When a growth which bleeds easily and freely is present, and acid pyelitis co-exists, there is a particular tendency to rapid absorption of any septicity introduced from without; such patients are very dangerous subjects for cystoscopy. As an illustration combining these three points, I may relate the following case:

J. M.—at the age of thirty began to have frequent micturition.

At the age of thirty-two suffered from hæmaturial attacks, which appeared and disappeared at irregular intervals.

At the age of thirty-eight caught a severe cold, and was admitted into a hospital with "hæmorrhagic cystitis;" was cystoscoped by a surgeon;—"nothing definite found;" no reaction.

At the age of forty-one he came under my care, passing concretions of phosphate of lime and muco-purulent urine. He suffered pain in both his kidneys when he strained to urinate. I withdrew twenty-six ounces of filthy, bloody urine, and ordered irrigation of the bladder. The urine cleared in fourteen days, and I attempted to cystoscope. He bled freely, and I saw distinctly a white turnip growth on the floor; I decided to leave it alone till later on. Diagnosis: epithelioma, complicated by atony of bladder and cysto-pyelitis. He continued to use his catheter three times in twenty-four hours until six months later, when I obtained permission to examine under ether. There was free bleeding, and the cystoscopy revealed nothing. A furious reaction followed—rigors, vomiting, suppression of urine, and death.

The report of the post-mortem was as follows :

Kidneys.—Both very large and pale; capsules not adherent. Pus in both pelves, more especially in left, which showed considerable dilatation. Left kidney substance, seen on section, pale and friable. The left ureter was dilated. In the right kidney several small cavities were found, the walls of which were thickened and lined with granulations, evidently abscesses of some age.

Bladder showed signs of recent acute cystitis. Situated on the trigone and at the sides of the orifice of the bladder were several masses of very friable growth, the surfaces of which were ulcerated deeply here and there. The largest projecting portion of this growth was roughly the size of an average thumb. The distal portion of this process lay right across the orifice of the bladder, and it must, in the lifetime of the patient, have prevented a normal act of micturition. The base of the growth infiltrated the bladder wall, but did not extend beyond it.

Prostate of normal size, firm and plump, no morbid condition detected.

CHAPTER XIV.

THE CYSTOSCOPY OF THE VARIOUS FORMS OF VESICAL GROWTH AND THEIR CLINICAL HISTORIES.

BROADLY speaking, the cystoscopist will encounter two well-marked varieties of vesical tumours: the villus-covered and the bald. Those clothed with villous processes may be benign or they may be malignant, but the smooth-surfaced groups are almost always malignant,* more especially if they occur after the age of forty-five. Nor is such a division devoid of practical utility, for it will be found that attempts at successful operative removal can only be made on those which are at first localised to the surface,—that is, on those covered by villous processes.

The first element, then, in rough differential cystoscopic diagnosis consists in noting the character of the surface of the growth, and some stress will be laid in the following pages upon this particular feature. Other differences exist, which sometimes enable the surgeon to form a fair opinion as to the benign or malignant character of the growth he is examining.

Cystoscopically, then, tumours may be considered under three heads, and this division, it will be found, is both clinical and operative.

- (A) The benign villus-covered growth.
- (B) The malignant villus-covered growth.
- (C) The bald malignant growth.

* In some the villi are so stunted, so closely set, and so covered in with epithelium, that the growth appears "bald," or like a child's closely cut worsted play-ball. The villi only become apparent microscopically; but this does not invalidate the rough-and-ready rule of bald growths being more often malignant than benign (cf. page 256).

A.



B.



Benign villous papilloma.

I propose to deal with each in detail, noting their visual characters, clinical life-history, and treatment.

(A) THE BENIGN VILLUS-COVERED GROWTH. THE VILLOUS PAPILLOMA.

The processes or "villi" which clothe the surface are often of extreme tenuity and resemble chorionic villi. Hence the villous covering of a growth in a sterile bladder forms a beautiful cystoscopic object (Plate XII). The delicate leafy processes are usually of a light fawn-colour, and are veined by the blood-red streak of their capillaries. They float freely about in the vesical water, trembling at every pulse of the iliac vessels, or every movement of the beak of the cystoscope, and swaying with the eddying rush of the ureteric streams near which they are usually placed.

The entire picture is often like a small aquarium with a hydra or a sea-anemone moving its tentacles around in search of prey.

The Villi and their Significance.—The villi differ very greatly in length, breadth, and colour. Some are so stunted as to appear like blunt diminutive cones, whilst others are so thin and long that they resemble ship's pennants (one and a half to two inches long). In some the leafy expansions are flattened and fleshy, with thick joint-like divisions which cause the growth to appear like a miniature species of one of the cactus plants; such form a dense variety of villous papillomata. Some are even foliaceous, and in contour resemble the leaf of the primrose, and are twisted or enfolded in various ways. Some villi are colourless, and of a dull white, perhaps because they are affected by epithelial change; others are translucent and reflect the light sharply. Others again are caked or powdered with white phosphatic grit, or reddened by adherent blood. Sometimes tails and flakes of white mucus stream from the individual villi and increase by many times the real length of the fimbriæ.

The villi vary even at different parts of the same

tumour. At one part of a tumour the villi may be stunted or even absent, and at another they may be long and luxuriant. It may be that the blunter, more conical type have suffered from apposition with the vesical wall, for they are often found clothing the under surface of the flatter tumours.

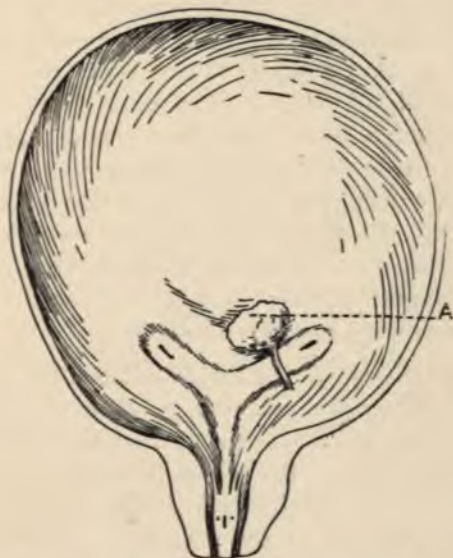
In a small proportion of the benign group *the surface may be papillated and yet on a casual glance it appears bald*, the villi being very short, and densely covered in by epithelium. *The colour of such growth is usually milk-white.* The surface is uneven and finely lobulated. Under the microscope it is easy enough to recognise the regular arrangement of the villi, but not so easy in cystoscopy. The eye should be trained to recognise this condition, and distinguish it from the absolutely smooth, reddish or white surface which characterises the epitheliomata in its non-ulcerated stage.

Clinical Note.—When villi exist, the question of operative interference at once arises, for most villous-covered tumours are only “*superficial*” at first, and many repay removal. I cannot say, however, that much can be learnt from the actual appearance of the villi as to the benign or malignant character of the growth. My impression is that when the longer luxuriant variety clothe the surface of a *single* growth, they usually indicate a benign character.* If the villous growth be multiple, the difficulty of diagnosing a benign character is increased, for epitheliomata may evoke pure benign villous papillomata clothed with villi of great tenuity and beauty, in the surrounding areas of the mucous membrane. Should the cystoscopist find more than *one* villous growth, he should undertake a careful and systematic search for evidences of malignant growth, in the shape of secondary plaques, and co-existing dull white, bare epitheliomatous tumours.

* I say this even with the knowledge that in the museum of the Middlesex Hospital (1745) the villi are very long and nodose, although they spring from an epithelioma.

The Core, the Pedicle, and the Site.—As a rule nothing is seen but the villous covering. The framework or core of the tumour is not visible. The attachment or base of the growth can only be roughly estimated by floating off the growth. This end is obtained by turning the patient from side to side, or on to his hands and knees, or by elevating the pelvis (Fig. 83), and thus allowing the

FIG. 83.



A, a villous papilloma floated downwards by position (Trendelenberg) to expose pedicle to cystoscopic view.

growth to drop away from its site and to expose its stalk. Another method consists in using an irrigating cystoscope to drive up the growth by a stream of water directed against it, but this plan is not so simple or so certain as the postural method. The pedicle may vary in thickness from a mere thread to that of a quill, and it is surprising how large a tumour may be nourished by a very thin pedicle. I have removed some the size of my fist with a pedicle the thickness of a quill. But there may be but little pedicle—only a fold of mucous membrane more or

less extended, or the growth may be sessile and arise without any trace of stalk or pedicle. In the latter case no change in the position of the patient moves the growth.

Clinical Note.—It will be found that a long-pedicated growth is usually single, that it has arisen from that portion of the mucous membrane of the bladder base which is extensible (that is, from outside the region of the trigone). It may be affirmed also that the absolute cure of the long pedicled tumour by removal is more hopeful, though the deterioration of the kidney is usually more marked, and the danger of its operative removal is greater. Pedicled villous growth is more often of a benign character than a sessile villus-covered growth. The more sessile the tumour, the greater will be the tendency to multiplicity (q. v.), the earlier the recurrence after removal. Sessile growth has, however, one counterbalancing feature in that its primary removal will be freer of danger, for it has not the same capacity of inducing backward pressure changes.

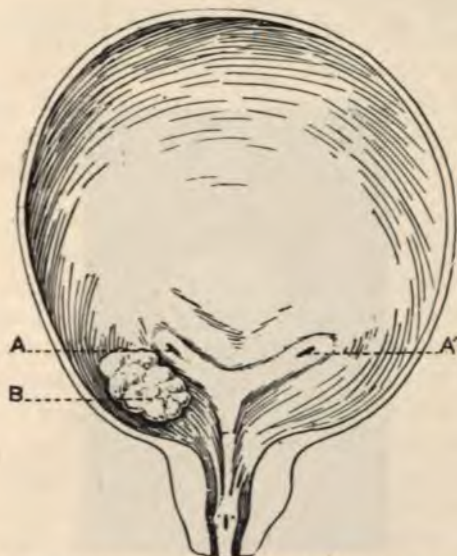
The Multiplicity of Villous Papillomata.—The greater proportion of cases examined early or operated upon early are single growths. In my first fifty cases all were single except three. But much depends on the duration of the case, for as time goes on, small secondary growths form around the site of the primary. At first these are mere splashes—some only the size of peas. They take up positions usually in one of two directions,—either towards the urethral orifice along the outer limbs of the trigone, or centrally up the posterior wall of the bladder.

Clinical Note.—I never care to see multiple splashes; it betokens, I am sure, a very decided tendency to wart production combined with a marked and continuous irritation. The prognosis of cure after operation will never be so good or so hopeful in multiple as in single papillomata. Nor can I shake myself free from the suspicion that there is a malignant action in multiple sessile growths.

The Position of the Villous Papilloma.—The position

affected by benign villous papillomata, as is well known, is in the neighbourhood of the ureteric orifice (90 per cent.). Careful cystoscopy will show that they are almost always outside the trigonal area to the outer side of the ureteric orifice and more often in front of it (*vide* Fig. 84). Very rarely are they on the true lip of the ureter

FIG. 84.



B, villous papilloma in front of right ureteric orifice A.

itself, and when they are found in this position they arouse a suspicion of direct irritation of an unusual kind from the kidney of that side.

Clinical Note.—The position of warty growth, or in fact of any form of growth, *near* the outlet of the kidney points to some irritation in the urine from that kidney. I may remind the reader that kidneys do not work always at the same rate, or produce urine of the same standard.* Not infrequently one kidney will be found

* Whether one kidney works at the excretion of salts while its fellow rests or works sluggishly I cannot say; facts for establishing this would mean infinite labour and work on the same patient, and this cannot be obtained

to excrete uric acid or oxalate of lime salts in a larger abundance than the other, and I have long regarded the kidney on the side on which I have found the villous papilloma as being the more active in excreting irritating salts than its fellow. It is with this action in view that I suggest, that to prevent recurrence, the patient should hereafter sleep on the side opposite to that from which the papilloma was removed.*

It is, as I say, very suggestive of profound renal in-

FIG. 85.



Oxalate calculus (not half size) which was removed through the perinaeum from the lower third of ureter. It had evoked a villous tuft on an everted ureteric orifice.

fluence to find a tuft of villous growth on the *lip* of a ureteric orifice. Thus I have removed a tuft from the prolapsed right ureteric orifice of a young man, from the lower third of whose ureter I also extracted a large with safety to the patient. A large series of cases of ectopia vesicæ might be utilised, and I have attempted to do this in one or two cases by means of methylene blue, and it certainly appeared that one kidney threw out the blue easier than the other.

* We do not, perhaps, realise the effects of posture on a bladder filled with the concentrated urine of sleep. The most irritating and the densest layer falls to the bottom (compare Posture in Tubercle, p. 210).

ureteric oxalate (Fig. 85). I have had an exactly similar case recently. In three other cases, tufts of benign villous growth at the right ureteric orifice, co-existed with renal carcinoma.*

Size of the Villous Papilloma.—There does not appear to be any law governing the size of the papilloma. The luxuriance of any particular villous papilloma does not appear to depend on the duration of its existence or on its position near the best blood supply. Bulk seems more to depend upon tendency to slow carcinomatous change; at least all the very large papillomata I have removed have been reported upon by the microscopist as possessing suspicious characters of malignancy.

Secondary Changes Visible in Bladders which are occupied by Villous Papillomata.—The character of the mucous membrane in the immediate neighbourhood of some of the sessile villous papillomata is often distinctly altered, and the recognition of these changes is, I submit, of importance. The surface may assume an appearance as if it had received the impress of a coarse thimble. Sometimes pure villous splashes or tufts are seen. If the tumour is flat and succulent, and broadly pedicled, and if one side of it lies in apposition to the bladder base, its upper surface is papillated, but the under surface is smooth and free from villous processes, whilst that part of the base of the bladder upon which it fell and habitually rested is reddened, swollen, and granular; it has lost its healthy sheen, and looks a little honeycombed. In one or two cases the mucous membrane around was inflamed and the glands stood out prominently, exactly like a miliary tuberculous affection (cf. the appearance in carcinoma). Large vessels will be seen, usually running in converging or parallel lines towards the base of the growth from the vascular supply of the bladder mouth. If there has been much squeezing of the growth on to the trigone and orifice of the bladder, these parts will also

* Compare Author, 'Tumours of the Bladder,' p. 12, *et seq.*

be found dull, reddened, and gelatinous—a condition usually announced by perinæal discomfort or pain.

The Ureteric Orifice (cf. Renal Ache, p. 268).—But it is more especially to the ureteric orifices that the cystoscopist directs his attention in benign growth.

In many cases the ureteric mouth nearest the tumour is reddened, and its normal contour is obviously changed. It is no longer a tiny slit but an elongated furrow-like opening. The adjacent growth has affected it in two ways—it has dragged upon it, and, in addition, it has inflamed it by contiguity. More especially is the ureteric orifice affected when the tumour is pedicled, and the attaching stalk has been long enough to allow of the papilloma being swept into the urethral orifice with the issuing urine. In such a case one of the ureteric orifices, if not both, will be seen obliquely depressed; at the outermost end of the furrow will appear the rounded orifice of the ureter. This condition shows that some backward pressure has been exerted upon the ureter, and probably renal pelvis,* for the ureteric orifice is a valuable and reliable index to changes in the contour and health of the corresponding ureter and renal pelvis. In all cases where there has been obstruction to the outflow of urine, the ureteric orifice or the bladder, or both, will show evidence of back pressure. It will be found, however, that when the ureteric orifice does not bear evidence of back pressure the bladder wall itself will show signs of the same force in the shape of little saccules, and much fasciculation. The general rule of the *early* stage of back pressure being, if the bladder hypertrophies, the ureter escapes; if the bladder does not hypertrophy, the ureters suffer and give way.

Clinical Note.—The following axioms may be advanced:

1st. The longer the pedicle of the growth, or the

* In thirty-six Museum cases in which the ureters were detected and noted, these channels were dilated in twenty-nine instances (80 per cent.); seven only had suffered no change apparent to the naked eye (cf. Author, 'Tumours of the Bladder').

laxer the surface of its implantation, the more likely is the tumour to float into and cork the urethral orifice, the greater the chance, therefore, of residual urine accumulating, and the greater the danger of dilatation of the ureters and renal pelves. Such cases will not bear rough sounding or slovenly cystoscopy.

2nd. The more sessile the growth, the more medianly it is situated on the posterior wall, the less the chance of renal complications ensuing in the early stages.

The macroscopical conditions (visual and tactile observations) which favour a diagnosis of benign villous papilloma :

A single tumour, with a definite, healthy, well-developed villous covering, pedicled in front of one ureteric orifice, without evidence of surface irritation around it (in the shape of thimbling or swollen mucous glands), raises the hope of a benign character. When such a tumour occurs in a patient before the age of forty-five* with a history, over seven years in duration, of an intermittent recurrent hæmorrhage of the symptomless type, that hope is strengthened. Lastly, if the operator, in performing suprapubic cystotomy, detects a single soft moveable growth swinging on a thin pedicle, and finds no induration of the base whence the pedicle arises, he may consider he is dealing with a benign papilloma. Even if the base of a pedicled growth feels a little hard, and the microscopist reports an "inflamed papilloma," he may still adhere, with the above conditions, to the diagnosis of a non-malignant growth.

Clinical history.

In attempting to build up the clinical life-history of a pure benign villous growth, we are met by many

* If ages of the patients are taken when the first symptom arose it will be found that nearly half the number of cases occur between the years of 30 and 45. The decades are as follows :

Before 20	6 per cent.	Between 50 and 59	14 per cent.
Between 20 and 29	12	" 60 " 69	8
" 30 " 39	20		
" 40 " 49	40		100

and distinct loopholes through which inaccuracies creep in.

There is first the difficulty of selecting those patients, and only those, who have suffered beyond cavil from the benign growth. Microscopy cannot help us to escape mistakes if the pedicle and the mucous membrane of the site of the growth are not submitted for examination. The base is frequently unobtainable. The operator may not have removed it. It may, if removed, be indistinguishable after the hardening process and escape observation—and part of the tumour itself is selected and reported upon. No true judgment of the character of any villous growth can possibly be formed by examining the surface. Again, our present state of knowledge does not allow of any conjecture as to when a benign growth commences to take on malignant action, and there is no doubt but that this change is not an infrequent occurrence; and lastly, microscopists themselves differ very widely in their reports upon the same section. The following work is therefore not free from inaccuracy, and although I have selected only those cases upon which I have operated, and only those in which I have received an expert report on the microscopy, yet the cases have not been watched long enough to confirm or rebut the diagnosis of benign growth.

The following clinical history, which I have sketched out, is based upon my first fifty operations, and controlled by later and riper experience.

Clinical life-history of the villous papilloma.

The onset symptom,* or group of symptoms, which first attracts attention to the urinary organs of a patient suffering from villous papilloma does not herald the birth

* The clinician who will not take accurate notice of "onset" symptoms in urinary disease will fail more often in sound diagnosis than he who cross-examines severely for the symptoms which first drew attention to the urinary tract. There can be but little value in drawing conclusions from the symptoms the patient is suffering from when he applies for relief; an approximate idea of the origin of the disease can only be gained by obtaining information of the site and character of the first or early symptoms.

of the growth. Far otherwise. The onset symptom merely marks the termination of the first stage in the existence of the tumour. In nearly every case of tumour which I have cystoscoped within a few weeks of the commencement of the symptoms, I have found the growth to be in size above that of a monkey nut. Moreover, in examining cases by the cystoscope to find the cause for recurrence of the symptoms after operation, I have found that hæmorrhage only reappears when the tumour has reached a decided size. Lastly, I have met with growth before any symptoms have occurred. Nay, I have even known a tumour so large as to exert back pressure on one kidney, and the first symptom noted to be renal pain, and the patient to be treated for rheumatism, lumbago, and renal calculus before the hæmaturia appeared.*

I have even removed a large pedicled growth from a lady patient whose first intimation of anything wrong was a tumour which fell into and blocked the urethra. Her symptoms were described by her as follows:—"I was running down a rough hill road when suddenly I felt something drop into my 'privates' and plug them. I could not bring my legs together, but had to walk, stand, and sit straddlewise. How I got home I do not know. I only remember that I attempted to urinate at every step and could not pass a drop, and screamed with agony all the way." Retention ensued for twelve hours; suddenly the corking growth slipped back and she got relief. Cystitis, of course, ensued.† All these facts concur in permitting us to recognise a latent period.

* Patient (R. S.—, æt. 32) was moving a case weighing 6 cwt. on October 18th, 1889, and suddenly felt pain in the left kidney. Direct pressure relieved it, but it increased until January 18th, 1890. On that day he passed a potful of bright blood, and immediately the kidney pain ceased. It returned, and ceased after three months on another attack of hæmaturia supervening. He now commenced to have an obstructed stream, and noticed he could pass twice as much urine lying down as standing. I cystoscoped and saw three villous papillomata, and removed them. One was pedicled, and lay over the urethral orifice. The pain in the kidney was quite cured by the operation.

† Case of Mrs. P. (No. 32, Table) is somewhat similar. Corking of the urethra took place three years before the hæmorrhage.

There are, therefore, three broadly outlined periods recognisable in the life history of a villous papilloma—the latent period, the hæmaturial period, and the final stage of cystitis with its consequent fatal renal complications.

The First or Latent Period.—No symptoms characterise this stage. The tumour, whether it be sessile or pedicled, gradually increases in size. It is only when its size permits of it being squeezed by the vesical walls in contraction that a little blood appears at the end of urination, or when by a sudden strain or over-exertion the base of the little growth is stretched, and a little blood issues and becomes mixed with the urine in the bladder. The latent period is thus brought to an abrupt conclusion, generally by the appearance of blood issuing from the urethra, either with or after the urine.

*The Second or Hæmaturial Stage.**—In a large proportion of the cases (84 per cent.) the second stage is ushered in by the blood appearing either at the end of urination or intimately mixed with the urine. Generally no cause can be assigned (80 per cent.); in a few instances only can some unusual exertion or fatigue be credited with the hæmorrhage. As might be anticipated, the bleeding is slighter and often insignificant when a provoking cause is absent. The bleeding is very rarely of a profuse type at the very outset, and then only when some severe strain has started it (6 per cent.). The hæmorrhage in most instances is accompanied by no other symptom, so that if the patient were blind or in the dark, he or she would not know that anything abnormal had occurred; it is, in fact, a "symptomless" hæmaturia.

* Criticism might find fault with my selection of this term for this stage, because it does not represent the character of the entire class. In a small proportion, 6 per cent., renal pain is suffered from before the bleeding, and in 10 per cent. symptoms of blockage of the urethra and distress in urination appear before the blood. But no class can exist without exceptions. The average clinician does not need to consider the atypical cases. He aims at knowing what he will usually encounter, and what he may usually expect in the ordinary run of cases.

In a few hours or in two to three days the bleeding ceases, either spontaneously or upon the exhibition of an astringent. The patient is now well. The incident may even be forgotten. For two or three weeks, or three months, or for a year, or for two years, or for six years, or for even twenty years there is no recurrence; then suddenly and without warning red blood again appears at the end of micturition, or is noticed mixed with and colouring the urine a darkish red.

A general rule may be formulated thus: "The smaller the amount of the initial hæmorrhage, the longer is the interval of health before it recurs. Should the onset hæmorrhage be marked, and have followed a strain or over-exertion, it will recur quicker and in larger quantities."

In the intervals of bleeding the urine will be quite normal. As time goes on the patient may aggravate a slight recurrent hæmorrhage by overstrain. A long walk, lifting weights, hard sculling, or tennis, even an attack of constipation will suddenly transform a simple bleeding, which is but seldom repeated, into a sharp hæmorrhage which recurs every week or so.

At first rest in bed diminishes the loss, and exercise tends to increase it. As the disease progresses the recumbent posture and the action of astringent medicines lose their effect.

It is, however, interesting to note that intercurrent disease has often a distinct influence, especially in women on an intermittent hæmorrhage from vesical papilloma. Thus the appearance of carcinoma of the breast checked a periodic bleeding for months. A quinsy gave one lady eight months' release; an attack of acute cystitis afforded another four years' freedom. Even dilatation of the female urethra for exploration of the bladder in one case, and rough sounding for stone in several others, arrested a troublesome hæmorrhage for some months. These cases came subsequently under my care, and I removed papillomata in every case.

It must be borne in mind that the patient is free from any symptoms which point to the bladder as the origin of the blood. There may be, and there often is, sacral aching, or weariness and pain at the fourth lumbar vertebra (*infra*, Renal Ache). There may even be irritability of the bladder and slight penile pain* when bleeding is present, but it subsides with the hæmorrhage, and is obviously due to local congestion of the bladder at the base of the growth. Sooner or later the hæmorrhage gets out of control and becomes almost continuous. The patient becomes pallid and listless. The sallowness and the loss of weight may even arouse suspicions of carcinoma.

Such is the usual course of the symptoms caused by villous papilloma of the bladder in the hæmaturial stage, and it may be summed up in a line,—the greater the tendency to loss of blood, the less the chance of other symptoms supervening.

Other Symptoms less frequently noted.—But hæmaturia, although the first and the cardinal symptom of this stage, is not the only one. As time progresses two important symptoms may arise, and may be especially noted as occurring in patients who do not bleed continuously and persistently; they appear, perhaps, in the minority of the cases:—1. A renal ache. 2. An impeded urination.

1. *A Renal Ache.*—In most cases the loss of blood alone entails a weariness and an aching in the lumbar region, in others there is a sacral ache apparently due to pelvic nerve distress, the result of nerve irritation by a sessile or hard-based papilloma.

It is,† in some, more especially marked at the fourth

* Cystoscopy reveals in these instances a sprinkling of phosphate of lime on the growth—an evidence of local loss of health and inflammation which often transiently affects the core and the immediate base. It is interesting to note how small an inflamed patch of the large area of a healthy bladder will cause symptoms of cystitis.

† 1. A lady æt. 43, a patient of Dr. Oldfield, had suffered from sacral ache and hæmaturia for two years. I removed a pedicled growth from the left ureteric area and the backache subsided. It recurred and was removed on

lumbar vertebra, but this central pain is not and must not be confounded with the lateral renal ache of villous papilloma.

This is experienced in one kidney, and nearly always* in that kidney whose ureteric orifice is nearest the papilloma. It is usually a constant, dull pain confined to the kidney, but may extend to the groin; this is never very severe. It is increased by deep inspiration, coughing, or exercise. Even urination, by exciting back pressure, is a cause for the increase in pain. The kidney is not usually tender,—in fact, the pain is relieved by pressure. The urine does not often contain albumen or casts, and the specific gravity is about 1020. Cystoscopy demonstrates the orifice of the ureter to be altered in contour. It is reddened, the edge may be puckered and the opening distinctly larger and more elongated than natural. Spreading to it from the villous growth which usually lies in front of it are leashes of vessels or congestive patches. I have been accustomed to regard this aspect of the ureteric orifice and the subjective symptoms as indicative of ascending inflammatory changes affecting the renal pelvis. I believe that the primary focus of inflammation is at the base of the growth. Cystoscopy and microscopy prove the papilloma, especially if it be of the tougher variety, to be prone to undergo local inflammatory changes. The cystoscopic evidence consists

seven separate occasions, each recurrence being heralded by aching in the sacrum.

2. S—, a man *æt.* 32, had been treated as a malingerer, or a rheumatic, by various medical men and hospitals when he came under my care with hæmaturia. He complained only of his back, stating "that it felt as if it was broken" at the fourth lumbar vertebra. I removed three large villous papillomata from the bladder, and immediately the backache disappeared. He was free for a year, then the lumbar pain returned. I examined and found the growth had recurred. I again operated and the backache ceased. This happened on four different occasions, the backache always notifying him of the recurrence of growth.

* *Exception.*—D—, *æt.* 50. Symptoms arose in 1894, with hæmaturia, some frequency and pain in *left* loin. In 1900 I removed a pedicled papilloma from the *right* ureteric orifice.

in a small patch of necrosis covered with glistening lime phosphates, seen here and there on the surface of the papilloma. The microscopical evidence consists in detecting exudation in the pedicle and base. One more point: the inflammation at the base of the papilloma injures the elasticity of the ureteric area. The lips of the orifice, which usually open and close, protrude and retract at each efflux of urine, now gape and remain fixed. Hence the readiness with which inflammatory changes may attack the orifice, and ascend the channel to the renal pelvis. So marked is this deterioration of the ureteric orifice that if the pedicle of the papilloma elongates sufficiently to permit of the growth falling into the urethral orifice, the back pressure set up by the impeded stream is exercised chiefly upon that ureter, from whose area the growth arises, and is "felt" by the corresponding kidney. Here are a few examples, taken from the first fifty cases I operated on:

Growths sessile and not impeding urination.

1. U.—Pain in right kidney; sessile papilloma removed from right ureteric area.
2. W.—Pain in right kidney; papilloma removed from right ureteric area.
3. F.—Pain in right kidney; sessile papilloma removed from right ureteric area.
4. H.—Pain in left kidney; papilloma removed from left ureteric area.

Growths pedicled and impeding urination.

1. R.—Pain in right kidney; papilloma removed from right ureteric area.
2. R.—Pain in right kidney and pyelitis; papilloma removed from right ureteric area.
3. S.—Aching in right kidney; papilloma removed from right ureteric area.

4. S.—Aching in right kidney; papilloma removed from right ureteric area.

5. T.—Aching in right kidney; papilloma removed from right ureteric area.

The lessons derived from the knowledge of this fact are—

First: Unilateral renal pain should always be inquired for. It not only gives the clinician a hint (in the absence of impeded urination) on which side a villous growth may be expected; but

Secondly: It renders asepticism in all instrumental and operative interference doubly imperative; and

Thirdly: It demonstrates the inutility of diagnosing stone or other disease of the kidney when a patient complains of unilateral renal ache and hæmaturia; it may explain the cause for some of those *negative* explorations which are nowadays so common in renal surgery. It is obvious how easily such mistakes in diagnosis can be made, and how much needless renal exploration can be avoided by the judicious and skilful use of the cystoscope.

2. *The Impeded Stream*.—A pedicled papilloma rarely announces its presence, in the first instance by floating into and obstructing free urination (cf. Case 265). As the tumour increases in size, however, its pedicle elongates by the suction-drag exerted on it by the out-flowing urine, until its excursions are free enough to enable it to block the urethral orifice, like a wash-basin plug, when the bladder is only partially emptied.

Nor is it necessary that the original papilloma should always be credited with these powers of obstruction. In a few cases a second and younger papilloma, pedicled and situated nearer to the urethral orifice, is the peccant factor in the disturbance. In one of my patients a *primary* single sessile button of villous papilloma was noticed. Three years later a damson-sized pedicled papilloma grew on the anterior wall in the middle line, half an inch above the urethral orifice. As the bladder gradually emptied it descended, and fell like a sluice-

gate over the opening when the bladder had only half evacuated its contents.

The time which elapses from the date of the appearance of the blood (the commencement of the second stage) and the blockage of the stream is very variable. It may take years, or it may not happen at all. But when it does occur it creates so striking a symptom that the patient complains of it even more than the appearance of blood. At first the impediment is annoying, finally distressing. The urination starts in a full stream, and after a few ounces or a third or two thirds of the urine have been evacuated, a gradual or sudden check to the outflow is noticed. One patient graphically described this action as being like "pouring tea from a teapot with a tealeaf-choked spout." Perhaps the patient alters his position, and finds that he can pass water better when lying on the side or the back, or by lifting up the body, only taking a deep breath and expelling it again: all such manœuvres obviously cause the growth to drop away from the orifice or drag it away by diaphragmatic action.

If the patient strains to overcome the obstruction, he experiences pain at the glans penis, and a little blood escapes at the end of urination. I have even seen blood pouring from the penis at the end of the act as if the growth was being squeezed like a sponge. Sometimes fragments of growth are torn off, and come away subsequently with the urine.

Frequency of urination is usually present with an obstructed stream. This is not the irritability of inflammation, for the urine may be brilliantly clear. It is merely the result of an unemptied bladder.

Two remarks, however, may be made. It does not necessarily follow that a pedicled growth will produce corkage even when it has apparently a very lengthy stalk and a free range of movement. Nor does it follow that an impeded stream should elicit renal pain, for both ureteric orifices may be seen enlarged without any back-ache.

A few minor symptoms complete the second stage in the life history of villous papilloma. Most papillomata gradually become inflamed at their base, and though this is entirely a local condition, yet it evokes frequency of urination, some scalding in the urethra, and penile pain. The attacks are, however, transitory, and often relieved by a little hæmorrhage. They are not to be counted as marking the third stage—that of cystitis. As time goes on the patient loses weight, becomes cachectic; this is sometimes due to the unilateral renal deterioration, but more often it is owing to the drain of the hæmorrhage. Palpitation, breathlessness, constipation, dyspepsia, and other signs of lowered vascular vitality appear.

The second stage is abruptly terminated by an attack of cystitis. The inflammation appears spontaneously in those cases which are not meddled with, but as often as not mistaken zeal prompts the medical man to wash out the bladder, and the third stage with all its attendant misery and renal risks is forced upon the patient years before it would otherwise appear.

The duration of the second stage, before the bladder becomes inflamed, is uncertain; it varies according to the implantation of the growth; the sessile have usually the longer life. Thus I have known patients with single *sessile* papillomata live comfortably for six, ten, thirteen, twenty, twenty-one, twenty-two years, and yet have healthy, non-purulent urine. On the other hand, the pedicled papillomata are exposed to violence; they bruise the vesical neck; they grow more rapidly and luxuriantly; the symptoms they elicit often necessitate the use of a catheter; infection therefore occurs earlier, and the stage of cystitis is reached comparatively sooner.

The third state—the stage of cystitis: In this stage the bleeding generally ceases, and purulent urine is passed.

I have met with more than one instance in which the patient was hurried into this stage by the exhibition of aluminate of iron. Obstinate constipation ensued, and

cystitis supervened. It has always seemed to me that the bowel is the peccant factor in the induction of this stage, for the cystitis is usually of the acid type.

Once cystitis is induced it rarely ceases entirely—certainly the congestion consequent upon the inflammation increases the pabulum for the growth of the papilloma and the growth multiplies. Irritability and pain wear out the strength of the patient. Inflammation ascending to the kidneys gradually cripples the functions of these organs. Thirst, nausea, morning sickness appear, and the patient dies exhausted, or suddenly succumbs to uræmia.

Types of Pure Villous Papilloma.

Sessile (recent).—(a) Q—, æt. 42, sent by Dr. Jackson, of Chorley. Six months before coming under my notice he had an attack of symptomless hæmaturia. It lasted two days. Five months later it recurred, and causelessly. There was no pain. The hæmorrhage became constant, and I removed, supra-pubically, a cherry-sized, sessile, villous papilloma, from the right ureteric area.

Sessile (old history).—(b) H—, æt. 73. Dr. Waller Gripper, of Wallington. Twenty years ago symptomless hæmaturia appeared, and recurred on and off for two or three years. Suddenly the hæmorrhage ceased without any apparent reason, and he remained free for six years. It then recurred at long intervals. Any severe exercise, such as straining at archery, gardening, sculling, caused it to return with violence. He never suffered any pain, except when large clots blocked the urethra. He had never had any instrument passed. Five weeks before I saw him he over-exerted himself in a boating excursion, and hæmorrhage appeared and became constant and severe. When I saw him his bladder was hugely distended with blood-clot. He was exsanguine, listless, and deaf, and fainted when we lifted him on to the operating table. I operated supra-pubically, and found a tough, villous papilloma occupying the left lateral wall. He recovered slowly, and I operated a few years later for calculus.

Pedunculated.—Mr. H—, æt. 27, sent me by Dr. A. Kennedy, of Plaistow. Ten months prior to seeing me he had suddenly and causelessly passed blood. This subsided, recurred, and became intermittent. It seemed to depend greatly on exercise, for it would

cease if he rested, and became profuse if he walked much; it even appeared after marital intercourse. The character of the stream was typical. The first half came in full volume, then it dribbled down. He used to strain greatly to finish emptying his bladder, then blood used to come, and pain was felt in the glans.

He used to micturate every one and a half hours to two hours in the day, and rise four to five times at night. If blood was present he had less frequency. I removed a large fleecy villous papilloma from the left ureteric area.

Atypical Villous Papilloma.—I have referred to a small class of cases which do not conform to the usual type, by entering upon their clinical life with the usual symptom—hæmaturia. These are atypical, for they only form 16 per cent. of the cases. They are divided into two groups. One group (A) has an onset symptom of impeded urination, and the other (B) onset symptoms which resemble those of stone in the bladder.

(A) In the *former* the first symptom is not that of hæmaturia, but of an impeded urination with or without renal pain. In fact, the growth is usually firm enough to increase in size without becoming frayed or lacerated on its surface or at its attachment by the violence which the contraction of the bladder always exerts upon a foreign body within its cavity. Usually these growths are coarse and luxuriant, and nearly always firmer in consistence, the villi are stunted and buried in epithelium. They are always pedicled.

The following examples will bear out these statements:

Mr. L—, æt. 40, was brought to me by Mr. C. Harrison, with a diagnosis of villous growth. For two years he had suffered from an impeded urination and from a continuous weight and bearing down in the genitals, with a pain during urination in the inguinal regions, inner side of thighs, and the penis. He had, moreover, a frequent desire to urinate, and impeded stream. After two years of these symptoms a profuse hæmaturia appeared, which became so alarming that I performed supra-pubic cystotomy at an hour's notice, and removed a coarse villous papilloma, which was pedicled to the right ureteric area. It filled a six-ounce measure-glass.

Mr. B—, æt. 32, who was sent me by Dr. Alex Turner, of Plymouth. This patient noticed the flow of urine suddenly checked before he had finished micturition. In five months he began to suffer from imperious desire, and his trousers often received an involuntary discharge of urine. He was sounded for stone, and immediately a profuse hæmaturia ensued, which became intermittent. I removed supra-pubically a villous papilloma, the size of a small tangerine orange; it was pedicled to the right ureteric area.

Mrs. P—. This lady, æt. 56, was sent to me by Dr. Lloyd Jones. Two years before blood appeared she noticed the stream of urine suddenly stop, and that when she shifted her position by rising from the stool the urine commenced to flow. The hæmaturia was started by a severe attack of bronchitis. I removed a chestnut-sized, villous papilloma, which was pedicled to the left ureteric orifice.

(B) In the second small group of atypical growths the symptoms commence with irritability of the bladder, penile pain, and a little blood, symptoms which resemble those of early vesical tubercle or stone. They arise either in the sessile or pedicled variety, and appear to depend on slight basal cystitis around the tumour.

Mr. G—, æt. 50, was brought to me by Dr. George Flower of Yeovil. Six years prior to my removing a small, tufted, sessile, villous papilloma from the right ureteric area, he was seized with a continual desire to urinate after muscular exertion, a little blood being passed at the end of the act. These attacks were very transient, though they recurred on over-exertion.

Mr. H—, æt. 50, sent by Dr. Clarke. Two years prior to my removing a fig-shaped and sized villous papilloma from the right ureteric area he had transient attacks of vesical irritability and penile pain. He had hæmorrhage after the bladder was sounded and "sucked" for a supposed calculus.

Clinical Summary of the Usual Form of Villous Papillomatous Disease.

Villous papilloma of the bladder is the direct result of a disordered renal function, co-existing with a tendency to wart formation,* that is to say, papilloma of the bladder would be rarely met with were it not that irritating urine from the kidney streams over the ureteric orifice and excites papillomatous growth in its neighbourhood.

At first the only symptom is the appearance of blood at the end of the stream, or mixed with the urine; but as time goes on the loss may become so profuse as to endanger life directly, or to lay the patient open to serious intercurrent disease. As the tumour enlarges a renal ache may be noticed, and an impediment offered to the act of urination. The kidney ache, which is evoked by ascending inflammatory changes, with or without back-pressure distension, forms a guide to the position of the papilloma; at the same time it should serve to warn the practitioner of the danger of exciting cystitis.

Impeded urination is due to the villous papilloma floating into and obstructing the urethral orifice. It invariably leads to the accumulation of residual urine. Hence this symptom is a contra-indication to vesical irrigation. Small inflammatory foci in the papilloma base cause slight local inflammation of the adjacent bladder wall, and transient attacks of frequency and urethral pain ensue. Finally, cystitis supervenes, and the highway to the kidney having been already laid open, renal symptoms are added to the clinical picture. These confuse the diagnosis, complicate the disease, and in time terminate the life of the patient.

* The patient often has cutaneous warts either hard or soft.

THE QUESTION OF OPERATIVE INTERFERENCE.

A few words upon the necessity or the advisability of operating upon a villous papilloma may be added to the brief foregoing sketch of the cystoscopy and life-history of such tumours. And first, it is wise to ask what symptoms force the operator to interfere, permitting of neither hesitation nor delay?

I hold that the following symptoms indicate that operation is a necessity.

1. *Long-continued, Severe Hæmorrhage.*

Operation is here a life-saving procedure. It may be, perhaps, considered as useless to interfere with a patient who has been bleeding continuously and freely for weeks, even months; to operate when the patient is bleached, listless, and breathless on any exertion; still more useless, it may be contended, to do so supra-pubically when the patient faints on being raised in bed. But it is not so. I have operated on many such, and it is the only means of saving life, for drugs are useless in such prolonged hæmorrhage. It is remarkable how well such a patient takes the anæsthetic, and how quickly he recovers once the bleeding has been arrested. But this cannot be affirmed of the patients who are suffering from malignant growth. In this the patient is weighted with an exhausting disease as well as blood-loss.

2. *Pronounced "one-kidney ache."*

This symptom is a distinct, though not an immediate, indication that the source of irritation should be removed. The ache will probably not subside on the removal of the growth,—in fact it may not disappear for months after. The kidney ache itself can sometimes be cured by making an incision in the loin, and by freeing the kidney in its fatty capsule.

I interpret this rightly or wrongly as pointing to the drag upon a sensitive kidney by surface adhesions, these latter being induced by inflammation travelling from the ureteric orifice to the renal pelvis, and from the renal pelvis to the cortex.

3. *Impeded Urination.*

This symptom, especially if it is accompanied by pain in the kidney on straining to micturate, demands supra-pubic removal of the growth. It should not be palliated by means of the catheter. Delay and catheterisation merely induce pyelitis of a type which can *never* be cured without nephrectomy.

A Condition Unfavourable to Operative Measures.

Pyelitis.—Symptoms of pyelitis, though they do not contra-indicate operation, are always grave evidences of renal deterioration and susceptibility. Co-existing pyelitis demands the strictest asepticism in operating, the greatest gentleness and exactness in removing the growth and its base, and the most complete and somewhat prolonged drainage of the bladder after the operation. If these provisions are not ensured, a fatality at the end of the third week may be expected. I lost four patients in my first fifty operations (Cases 4, 11, 20, 29), all from renal complication; two, I am grieved to say, I trace to the direct result of insufficient drainage. With knowledge acquired from these, I have, however, lost only nine in one hundred and thirty-five removals of all forms of growth (page 317).

The Advisability of Operation.

But presuming the operator is not forced to operate by such urgent symptoms, what advice should he give to a patient suffering from villous papilloma? Much will depend on the cystoscopy. If the papilloma is stalked,

if the ureteric orifice is seen to be narrowed and inflamed, I hold that operation is indicated. If, on the other hand, the growth is small and sessile and well away from the ureteric orifice, it is better to re-examine * in six months' time and note the rate of increase, and whether seedlings or splashes are forming around, rather than to operate.

It is interesting to note that these small villous papillomata are often apparently controlled, both as regards their increase in size and the symptoms they evoke, by careful regulation of the diet, by altering the character of the urine, and (?) by sleep posture. I generally place the patient on a dietary as free from meat as is consistent with his occupation and health, strictly forbidding fruits causing the output of oxalates (rhubarb, pears, etc.). Boiled water, rain water, distilled water, Salutaris, Pluralis, Malvern water are advised rather than the ordinary drinking water. Every morning a tumblerful of Contrexville or Vittel water should be taken half an hour before breakfast and the same at bedtime. If the papilloma springs from one ureteric orifice I suggest that the patient should sleep on the opposite side. If the growth is on the posterior wall, a side position should be adopted.

* Always with the same full bladder, the same elevation of pelvis, and the same magnifying power of the cystoscopic tube.

NOTE UPON TWO ELEMENTS OF DOUBT IN THE DIAGNOSIS AND
PROGNOSIS OF THE BENIGN VILLOUS PAPILLOMA.

The cystoscopist who aims at accuracy in diagnosis and prognosis must always carefully reckon with two errors which may creep into his appreciation of the character of some of the cases of apparently benign villous papillomata. The first is the chance of a gradual malignant transformation of the stalk or base of a benign papilloma. The second, the co-existence of benign papillomata with carcinoma either of the bladder or kidney.

(A) *The Gradual Transformation of a Benign Papilloma
into a Malignant Papilloma.*

I cannot say that this will be frequently encountered. Our present knowledge of these growths is as yet too immature and the chances of error are too great* to permit of any dogmatic statement as to the probability of such a change taking place in any given case; still less of the frequency with which such a change may be expected. Cases, however, occur which point to such a transformation, and we have the well-known clinical analogy of papillomata of the skin taking on malignant action.

Although villus-covered malignant papillomata are usually more indolent in their growth than other forms of malignant disease of the bladder, yet I have met with cases eventually proving to be the former disease which have been marked by symptoms extending over twenty years. This prolonged life forces me to suspect that the papillomata were at first benign, but that bladder-fret combined with a marked carcinomatous predisposition gradually transformed them into malignant growths. Thus :

Dr. Mooney brought me a gentleman æt. 44, who had suffered from symptomless hæmaturia for twenty-two years before coming under my observation. He had had intermissions—being in perfect urinary health for so long a period as ten years in one interval, and four years in another.

* Cf. Author, 'Tumours of the Urinary Bladder,' p. 67.

Four years prior to his cystoscopy his stream became blocked, obviously by growth occluding the vesical orifice, and the difficulty in urination culminated in retention, for which the catheter was used. Cystitis ensued, but partially subsided; it recurred, and at the fourth attack pain in the left kidney supervened. I removed, supra-pubically, a large, walnut-sized, broad-pedicated, villous papilloma from the left ureteric area, and another and smaller from the right ureteric area. The bases were succulent, and Mr. Targett reported they showed malignant characters. He recovered; but the growth returned, and he eventually died uræmic.

A few other cases incline me to believe that the stalks or bases of those which seem to take on malignant action thicken and shorten, until the entire growth becomes sessile, or absolutely sessile (cf. Figs. 87, 88).

(B) *The Co-existence of Benign Papillomata with Carcinoma of the Bladder or Kidney.*

I have shown from museum specimens that certain epitheliomata of the bladder are able so to irritate the surrounding healthy vesical surface that pure or benign papillomata spring up.* My cystoscopic and clinical knowledge corroborates this fact, which renders it a serious source of error in settling the question as to whether any given multiple growth is worth while removing.

As an example, Fig. 86 represents a bladder which I removed from a male patient aged 58. "Above the right ureteric orifice is a benign villous papilloma with some chronic inflammatory change, but it offers no evidence of malignant disease. Around it is a dense villous epithelioma (squamous-celled), a variety which is not that which one would expect to be due to malignant transformation of a papilloma" (Mr. Targett's report).

Again, some renal carcinomata give rise to benign papilloma at the orifice of the ureter of the diseased kidney, or at the vesical orifice of the urethra. I have met with cases in practice. I need hardly say how puzzling such are, for the real source of the trouble is overlooked.†

* 'Path. Trans.,' February, 1888.

† Cf. Author, 'Tumours of the Urinary Bladder,' p. 12.

A good example is in the Royal College of Surgeons' Museum (Spec. 3691). A small, soft, semi-transparent papilloma is seen attached by a narrow pedicle to the neck of the bladder, immediately above the orifice of the urethra. One end of the right kidney was occupied by

FIG. 86.



a round mass of soft, spongy substance, which microscopically was proved to be cancer. Judging from analogy of various similar cases the papilloma had been called into existence by the irritation of discharges from the carcinomatous kidney.

CHAPTER XV.

VILLUS-COVERED MALIGNANT GROWTHS (PAPILLIFEROUS CARCINOMA).

ON examining the cystoscopy of villus-covered malignant growths, and on analysing their clinical and operative histories, we cannot avoid the inference that they form an intermediate class between benign papilloma on the one hand, and malignant infiltrating growth on the other. They resemble the former in their comparative indolency and in their superficial structures when they are in their earlier stages, whilst they are akin to the latter in their basal tissues when far advanced.

The Macroscopy: Visual and Tactile Observations.—Cystoscopy of a pronounced villus-covered carcinoma shows the growth to be covered with villi, perhaps more stunted and more succulent in character* than those which clothe the benign papilloma. Moreover, the proportion of those tumours which appear *bald* of villi†—those in which the villi are present, but greatly covered in by an exuberant epithelial layer—is greater in this group than in the benign (18 per cent. as against 8 per cent.). Single tumours also are more rarely met with in operations upon this tumour than in the purely benign (65 per cent. as against 92 per cent.). In fact, the

* I am here alluding to primary growths. When a growth has existed for some time it is very liable to produce secondary splashes and growths, which are often clothed with villi of great tenuity and beauty.

† Compare clinical note on p. 256.

character of the class is towards multiplicity, a condition which becomes more and more pronounced as time goes on. Thus, in museum work on what may be termed completed cases, such tumours are very frequently multiple, whilst in patients who have been operated upon the recurrence is invariably in the shape of a multiple growth.

Again, the tumour or tumours are more often sessile than in the benign group (53 per cent. as against 28 per cent.), and when pedicled, as they are in 47 per cent. of my operation cases, they are noted as having had "thick," "dense," "stout," "short" pedicles, or to have been broadly inserted—descriptions which denote the gradual increase in the stalk from malignant interpenetration. Finally, in the sessile group, small clear, grape-like bodies may be noticed at the growing edge of the patch. These are distended glands, a condition which, rightly or wrongly, I look upon as being evidence of deep infiltration.

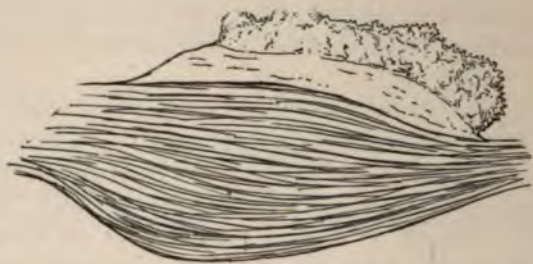
These growths also affect the ureteric areas, the right being, perhaps, the more often the site of the original tumour.

The rectal examination of the bladder base is often quite negative for the first two or three years. In fact there is very rarely any definite hardening due to infiltration until quite towards the end of the case. The clinician will probably note there is a feeling of bladder fulness, or think he is touching an hypertrophied muscular wall, *but* he will not detect that hard cake-like induration so characteristic of the infiltrating group of vesical cancer. The same remarks hold good as regards vaginal examination.

The prostate in men, about or over sixty, whose bladders contain a villus-covered cancer will be noted to be often tougher, harder, and smaller than natural; but whether this is due to propinquity of the growth, or other well-known changes which occur at this age, I cannot say. It is not due to infiltration of the disease. I have been inclined to

believe that a succulent enlarged "senile" prostate is rarely met with when villus-covered cancer is present.

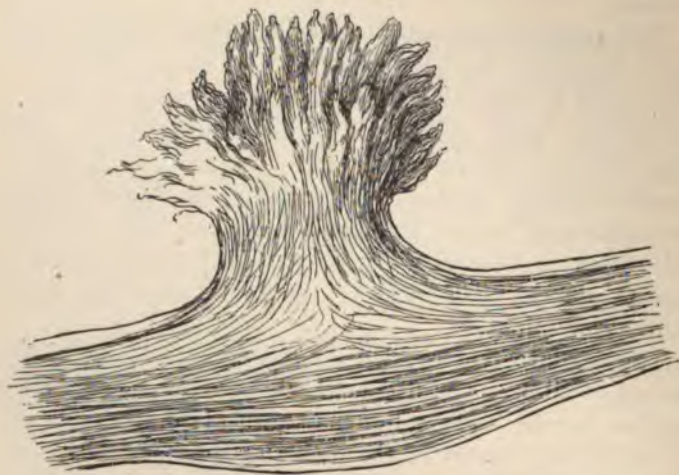
FIG. 87.



A villus-covered carcinoma, showing the short villous processes, the thick infiltrated submucous tissue, and the hypertrophied infiltrated muscular layers.

Should supra-pubic cystotomy permit of a direct examination of the growth by means of the finger, two conditions will be noted. The tumours will be found either to be in the form of spongy, uneven, sessile masses (Fig. 87)

FIG. 88.



A villous papilloma with a thick carcinomatous base (malignant papilloma).

or as spongy growths with thick short pedicles (Fig. 88), and an area of hardness around the site of implantation.

When such tumours spring from the posterior wall they may attain a remarkable size, the pedicle being broad and succulent. Fig. 89 is a good example of this

FIG. 89.



Bladder cut down the front and turned back like an open book, to show a villus-covered carcinoma springing from the posterior wall. (Note the deep infiltration of the wall at the base.) (University College Museum, 1475.)

fact. Several of the largest tumours I have removed, averaging from $\frac{1}{2}$ lb. to 1 lb., were of this class.

The Clinical History of a Villus-covered Malignant Growth.

1. *The First or Latent Stage* calls for no remark.
2. *The Second or Hæmaturial Stage.*—The onset symptom of a villus-covered malignant growth is usually hæmaturia, and the hæmorrhage is strikingly like that

noticed as revealing the existence of a benign papilloma. Herein lies the first great difficulty in distinguishing on clinical grounds between the two diseases.

The bleeding *usually* commences between the ages of 50 and 60,* a little later in life than is noticed as marking the benign type.

Nor can any cause be usually assigned as a reason for the hæmorrhage, only a possible traumatic connection occurring in about 4 per cent. of the cases. The onset bleeding, moreover, is very rarely profuse, and if it is severe it is generally traceable to some unusual strain or indirect violence.

Generally it is slight, easily controlled, subsiding in two or three days, recurring, as in cases of benign papilloma, spontaneously, and continuing intermittently with increasing severity and increasing obstinacy until the stage of cystitis is reached, or until the bladder is irrigated and cystitis is induced artificially by catheter infection. The hæmorrhage then subsides to a great extent.

Renal Pain and Stream Impediment.—Villus-covered malignant growth evinces a marked tendency to grow around and occlude the orifice of the ureter† or urethra, and thus cause in the course of time, though by a different mechanical force, that renal pain and stream obstruction to which attention has been called under the head of papilloma. It is, however, rare to notice these symptoms early in the history of the case.

The duration of the hæmaturial stage is very variable, nor can it be accurately determined, because this class includes cases which have probably commenced as benign

* Age at onset of hæmaturia in villus-covered malignant growths:

Before 30 ...	5 per cent.	Between 50 and 59 ...	38 per cent.
Between 30 and 39 ...	16 "	" 60 and 69 ...	18 "
" 40 and 49 ...	21 "	After 70 ...	2 "

† It is not uncommon in removing luxuriant growth from the ureteric area to find a channel running through the entire thickness of the mass. Mr. Targett suggests that this channel is the mucous membrane of the ureter itself everted.

growths, but which subsequently have taken on malignant action. Thus the hæmaturial stage is noted in individual cases as continuing for six, seven, nine, ten, twelve, fifteen, even twenty-two years. Putting these exceptional cases on one side, the duration may be considered on an average to be about three years. Many, however, run through their second stage within the two years.

Two prominent causes apparently curtail the duration of this stage; one is an initial traumatism, the other early catheter infection.

The Influence of Traumatism upon the Hæmaturial Stage.

It will be noticed that when the initial hæmorrhage is profuse it is usually traceable to indirect violence. Probably the surface of the soft growth is split, and the resulting changes induce a stage of subacute inflammation. Superadded then to the hæmaturia are those symptoms which indicate cystitis. As an example :

Dr. Haynes Lovell sent me a patient, æt. 43, who five years before had lifted a heavy landau carriage and "strained himself." Half an hour later he passed a quantity of bright blood and clot. He had intense dysuria at once. The blood ceased in a fortnight, but the vesical irritability continued, and three or four days later he experienced a post-scrotal pain of some severity. The stream became small. He had right renal pain, and passed two small phosphatic stones like split peas. A quack diagnosed stricture, and "sprayed" him for eight or nine months, to the increase of his sufferings.

When I saw him he was breathless and bloodless. He smelt urinous, had incontinence in his sleep, and great frequency of micturition when awake. He had constant suffering in his anus, penis, and right kidney.

On examination the prostate was small and free; there was no cake-like infiltration, but the bladder felt "full." Cystoscopically a mass of villus-covered growth could be seen on the right base. In order to relieve him I performed supra-pubic drainage, taking the opportunity of examining with the finger. Masses of soft spongy

villous epithelioma could be felt entirely surrounding the right ureteric and the urethral orifice. All over the posterior and left lateral walls were secondary elevations of varying sizes of smooth epithelioma (? contact growth). He was greatly relieved, and I heard that he died five months after.

The Influence of Irrigation upon the Hæmaturial Stage.

Washing out the bladder—a manœuvre most suitable and most valuable for the stage of cystitis—is here uncalled for, and merely induces, and therefore anticipates, that inflammatory period which is so detrimental to the health and activity of the patient.

I have no hesitation in asserting that when once this stage has set in, the luxuriance of the growth becomes marked; the supra-pubic wound, if operation is subsequently undertaken, closes much more slowly, and often imperfectly; the recurrence of the growths after removal is infinitely quicker; the sufferings of the patient are greater, and the duration of life is greatly curtailed. Irrigation then in the hæmaturial stage is the worst possible policy.

The Third Stage, or Stage of Cystitis.—The symptoms of this stage differ somewhat from that noticed in the benign papillomata. There is often the same obstruction to the stream, due to the encroachment of the bladder orifice by the growth, the same straining to overcome it, the same frequent micturition, and probably the same penile pain. The same one-sided renal pain from back-pressure and pyelitis, with the occasional passage of phosphatic grit from one renal pelvis.

But, in addition, there is also that gradual loss of weight, which is not due to blood. There are certain renal symptoms which develop early the thirst, perhaps sickness, and the marked failure of strength. Moreover, there are those severe symptoms which are due to the filling up of the vesical cavity and to the infiltration of

* Causes assigned: Lifting a heavy weight, shifting weights, a fall straddle-wise, hurrying to catch a train, severe mental shock, etc.

muscle layers beneath the growth. Chief among the former is formation of phosphatic crusts which fret and irritate the bladder, exaggerate the cystitis, and accentuate the sufferings of the patient. Prominent among the latter is that distressing, often agonising, spasm of the irritated muscle tissue. Finally, if the patient does not succumb soon enough, those symptoms induced by secondary deposits are superadded.

Typical Cases of Villus-covered Malignant Disease.

Case 1.—J. P—, æt. 60, under Dr. J. H. Keay, of Colne, Lancashire. I was called May 2nd, 1893, to this gentleman, who had had during the last year three separate attacks of profuse hæmorrhage, each of which had been the direct result of some indirect violence. On each occasion the loss was very great and difficult to arrest. There was no frequency; no pain. When I saw him he was bleached and listless. The bleeding was alarming. There was no vesical irritability or pain. His pulse was very soft. On obtaining leave to operate I cystoscoped, and discovered a villus-covered epithelioma, about the size of a walnut; it was situated on the left side of the base. I hesitated in the enfeebled state of the patient to do supra-pubic cystotomy, but performed perineal section, and removed the growth with long forceps. The core or base was left.

I have only been forced to use the perineal route three times on account of profuse hæmorrhage and profound shock. It has very little to recommend it. With increased experience I prefer supra-pubic cystotomy.

The bleeding was checked in a few hours, and he was in the country in five weeks, being up and about at the end of the third week.

Five months after the operation he passed a clot, then blood, but was in "better weight and physical health than he had ever been in his life." At the end of ten months the hæmorrhage was severe enough to necessitate interference, and supra-pubic cystotomy was performed on March 17th, 1894, the growth being removed as thoroughly as possible. Subsequently he had pain in the left kidney, and five attacks of left renal colic in June, but there was no fever or dry tongue. He became emaciated. The bladder symptoms gradually returned; pain was subdued by morphia; the rectum became involved, and drowsiness and coma ensued.

He died end of November, 1894, eight and a half months after the supra-pubic cystotomy.

Case 2.—E. L—, æt. 53, was sent to me by Dr. Kennedy, of Plaistow.

Onset.—Three months before I saw this patient he was in perfect health. One morning at that date he passed blood at the end of micturition. He noted that at the commencement of the stream the urine was natural, but it was bright red at the finish. In two days' time the bleeding ceased. There was neither frequency nor pain. A fortnight after, dark red blood appeared intimately mixed with the urine. This lasted two days. It again ceased, and again recurred. The hæmaturia was throughout symptomless. Prostate small and firm, not hard. Vesical wall not infiltrated.

Examination.—Cystoscopy. Bladder held ten ounces easily. The mucous membrane was healthy except over the right ureteric orifice. Here a heavily stalked succulent growth, the size of about half a walnut, was found. Covering its surface were brownish necrotic (?) villi. Its character was that of an epithelioma. The prostate was a little dense to traverse with the cystoscope; but the bladder base was non-infiltrated.

Operation.—In the hopes of removing this with the mucous membrane I performed supra-pubic cystotomy. It was easily removed through the caisson, and the hæmorrhage checked with an application of iron. Healed rapidly.

Mr. Targett reported the specimen to be a villus-covered malignant growth.

Six months after the operation he came to me complaining of pain in his *right* leg, of pain in the glans penis after micturition, with shooting pain in the rectum. The stream was shot out three or four feet at first, but it dribbled down quickly, and it needed a prolonged effort to finish. Frequency every two hours. Two days later the right leg swelled up, apparently from plugging of the femoral vein. I at once examined for rectal infiltration, and found the right side of the prostate and the adjoining base of the bladder were fused and like a stone in hardness. It was so thickened, and the swelling projected backwards so greatly, that I could not get my finger over it. The œdema of the leg subsided, but his vesico-rectal pain increased; the supra-pubic scar opened and urine, mucus, and blood were ejected from it and from the urethra every half hour, with intolerable pain. He died nine months after the operation.

Notes on Atypical Cases.

In describing the most usual clinical history of villus-covered carcinoma, I have alluded to the onset symptom as being hæmaturia. As in the benign group, so in this, there are of course exceptions to this rule. In 15 per cent. of the cases the first symptoms were irritability of the bladder and some penile pain, blood occurring later. With these onset symptoms the growth was found somewhat more akin to infiltrating carcinoma, in that the tumour was tough and its base was hard, and a little cystitis had occurred in its neighbourhood.

Illustration.—J. M—, æt. 60. Two years before the cystoscopy he began to have frequency and a little pain in the glans on urination. The stream was good. Three months later he passed bright red blood. The hæmorrhage ceased and recurred. A sessile villus-covered growth was found post-trigonally. There was evidence of surface infiltration. I removed it supra-pubically, and it was reported to be a very vascular villous carcinoma. (Targett.)

But in 10 per cent. an impeded stream formed the onset symptom, and in these a pedicled growth fell on the neck of the bladder and blocked the orifice, the tumour being tough enough to grow to the requisite size before its surface became eroded.

Illustration.—R. J—, æt. 41. Eighteen months before the cystoscopy he began to experience a difficulty in urination. After starting water it stopped. Frequency ensued, especially during the night. Pain appeared in the rectum at the commencement of the act, and in the glans after the act. Bleeding also appeared. At first it was slight, and afterwards became severe, with clots like thick fingers. For twelve months he has had incontinence of urine at night at intervals. He has lost flesh the last few weeks,—one and a half stone. He is thirsty and anæmic. Frequency every half hour day and night. Urine 1005, acid. The base of the bladder feels thick and "filled" with a hardish orange-shaped mass.

Cystoscopy.—A smooth growth on right side; it was removed supra-pubically, and filled a 2-oz. measure. Targett described it as a "villous carcinoma."

Indications for Operative Removal.—These had better be discussed later (p. 320).

CHAPTER XVI.

"BALD" MALIGNANT GROWTH.

It is neither the object, nor is it within the scope of this short clinical study, to describe the clinical features of the *rarer* forms of malignant disease of the bladder. The sarcomata in childhood and the adult, the acute carcinomata which acquire an enormous size in a few weeks, malignant growth arising in a diverticulum of the bladder, —such and like rarities are so seldom encountered that they may be considered pathological curiosities, and special treatises should be consulted if information is required concerning them. This chapter contains a brief consideration of the early stages of what is commonly known as "cancer" of the bladder, and of that group which is "bald" or not covered with villous processes.

"Bald" growth will be found to differ remarkably from villus-covered malignant growth in the character of its onset symptoms, in the rapidity of its course, and in the small chance offered by operation for its relief. Why this accident of a covering should split off two forms of malignant disease is not apparent. There is no doubt in my mind, however, that this point of cystoscopic difference should neither be overlooked nor under-estimated.

Bald Epithelioma.—When epithelioma attacks the mucous membrane of the bladder its energy is generally expended in one of two directions. Either it rapidly interpenetrates the wall of the bladder, infiltrating it early and deeply, or its activity falls upon the surface and is displayed in tumour formation, and under this latter condi-

tion it is not until a later period that the deeper structures of the wall are implicated by extensive downgrowth.

The following two equal-sized photographs will illustrate this statement. Fig. 90 represents a squamous epithelioma from Guy's Museum (Spec. 1794), arising from the

FIG. 90.



Flat patch of infiltrating squamous epithelioma.
(Guy's Museum, No. 1794.)

left ureteric area of a man. It has eaten deeply into the subjacent wall, its vesical surface being flat and necrotic. Fig. 91 represents a typical squamous-celled epitheliomatous tumour arising from the posterior wall of the bladder. The mass appears to have been very vascular,

and its anterior and lower part is soft and broken. The history was only of six months' duration.

Now as the former class—the infiltrating group—are the more common, and as the invasion can often be easily detected by rectal examination at an early stage of the

FIG. 91.



A large squamous epitheliomatous tumour from posterior wall of bladder.
(R.C.S. Museum, No. 3703.)

disease, and as, when infiltration is discovered, it settles the diagnosis and prohibits all instrumentation, I venture to allude to this feature in detail before discussing the cystoscopy and clinical aspects of either group. There is also a pitfall in the rectal examination of the other group—of the tumour-forming epitheliomata, which should

be alluded to. It consists in the apparent burial of the prostate by a large intra-vesical soft growth.

NOTE ON RECTAL EXAMINATION IN MALIGNANT DISEASE.

*Infiltration of Wall—Burial of the Prostate—
Prostato-vesical Ouirass.*

Infiltration of the Vesical Wall.—I have mentioned already *that a rectal examination should always precede a cystoscopy, and that the utmost gentleness should be exercised in conducting the exploration. Any rough pressure upon the base of a bladder involved by carcinoma may bruise or even break the cake-like deposit of hard growth, and induce hæmorrhage and cystitis.

The patient, having emptied his bladder and knelt upon a couch or bed with his forehead as close to his knees as possible, takes a deep breath and holds it for a few seconds during the examination. These manœuvres force the bladder base towards the pelvic outlet and render a wider exploration easier and more possible.

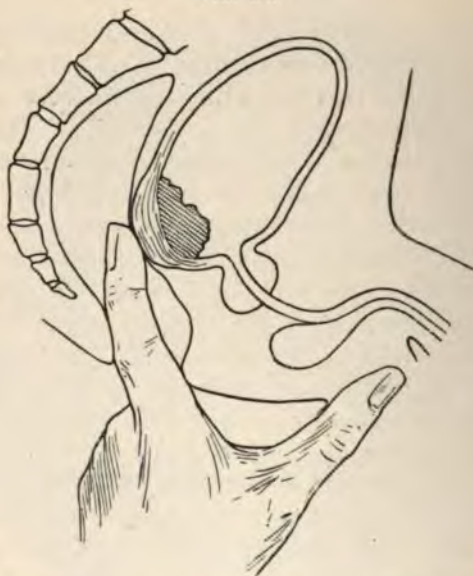
The position most often affected by infiltrating carcinomata is the posterior surface of the bladder. This corresponds to the post-trigonal area (Fig. 92). The finger discovers this region immediately behind the prostate; probably in every case it is accessible, for there are grounds for believing that the prostate is rarely enlarged in vesical carcinomata. The difference between the thin, supple, and depressible post-trigonal wall of health, and the thick, resistant, cake-like condition it assumes when the musculature is infiltrated by carcinoma, is so marked and so appreciable as hardly to merit description† (Fig. 93).

* Rule 2, p. 243.

† There is a distinct difficulty in eliminating senile tuberculosis of the vesicle, but this condition is extremely rare. I need not remind my reader that the vesicles lie more to the side; that they are not very distinctly *felt* even in health, still less are they distinguishable at the age when vesical carcinoma arises (Circ. æt. 60), for atrophy has set in; that if felt and spongy they are only encountered in the young adult, and then it is an

Moreover, light pressure on the induration evokes pain, and this is referred to those areas in which pain is habitually felt by the patient. Its most typical development is in carcinoma of the base of the *female* bladder. The entire surface of the vesico-vaginal septum feels transformed into a stiff, nodular, thickish plate, often like the

FIG. 92.



Finger detecting infiltration of the posterior wall of the bladder from growth spreading over post-trigonal area.

cuirass cancer of the female breast. If the post-trigonal area is felt lissom, the finger *must* be carried higher along the course of the ureters and across the superior or intestinal wall. Lastly, the patient is examined bimanually in the supine position, and if possible under ether.

How soon may infiltration be noted after the onset

evidence of block of the duct. If they are hard and dense in the young adult they are probably tuberculous. Cf. Author, "The Rectal Contour of a Thousand Prostates," 'Brit. Med. Journ.,' February 18th, 1899, p. 395.

of bladder symptoms? I have several times found well-marked infiltration within two months of the commencement of the bladder symptoms—in many it can be detected

FIG. 93.



Soft spheroidal-celled carcinoma (primary) affecting base (R.C.S. Museum, No. 3707). A vertical section of a bladder and rectum. The prostate and lower part of the bladder are occupied by a solid growth, which has infiltrated the neighbouring structures, extending forwards along the corpora cavernosa of the penis, without invading the urethra, though it obstructed that canal by pressure.

Note by Mr. J. Targett.—The prostate is unaffected. Growth is primary in bladder. It appears to be a very soft, spheroidal-celled carcinoma.

within six months—in 50 per cent. infiltration was apparent before the end of the first year, and in 82 per cent. before the end of the second year.

A Possible Error in Prognosing the route of the Extension of the Disease.

Rule.—Judge of the route of probable extension by the pain, not by the *position* of the hardness in the vesical wall.

Infiltration of the base tends to surround the orifices of the bladder—the ureteric and urethral. Usually it is most pronounced at one ureteric orifice. The vesical part of this canal becomes gradually throttled, and pain due to distension of the renal pelvis is felt in the corresponding kidney. Pain in the left groin and down the inside of the thigh of the same side appears almost coincidentally.

Now in my earlier cases I was accustomed to point out which kidney would first become affected. I took as my guide that side on which I felt the mass most pronounced, believing that the greater the mass of growth around an ureter, the sooner would that channel become strangled.

This is not always accurate in the absence of a cystoscopy of the ureteric orifices, for a more exuberant growth may sometimes be felt *per rectum* on one side, whilst on the other it is throttling the ureter more decidedly by a less extensive, less feelable, but more deeply-extending deposit. It is, perhaps, safer to wait for the clinical symptom of renal pain.

As an example I may allude to the case of a lady under Dr. James Jardine, of Richmond. The finger encountered a hard protuberant cake of carcinoma in the vesico-vaginal septum. This was very massy on the right side, whilst only a small tongue of growth could be felt around the left ureteric channel as it entered the bladder; but the small growth on the left side was the more dangerous for the patient complained bitterly of left renal, left groin, and

left inner thigh pain. The left kidney was moveable and not enlarged.

Nor should the size of the inguinal glands be considered as a guide to the side on which the disease is progressing fastest towards the kidney, for the glands of one groin may be shotty and involved, but the pain may be felt at the pubic spine, the inner side of thigh, and sciatic of the opposite side. It is best, here also, to trust to the indication which pain presents of the track of the disease.

The following axioms may be accepted :

1. The greater number of cases of bald malignant growth affect the lower third of the bladder and infiltrate the base early (70 per cent.).

2. Absence of infiltration does not mean absence of carcinoma ; it indicates only that the growth, if present, has not extended through the muscle layers ; and if the symptoms have been over two years in existence, it proves that the growth is indolent.

3. Deposit of hard carcinoma in a ring round the vesical orifice is not detectable *per rectum* in its early stages. A vertical stream and furious bleeding on gentle instrumentation are better indications for hard growth placed around the neck of the bladder than rectal examination.

4. The side on which the pain is first felt is the indication of the line along which the growth is extending.

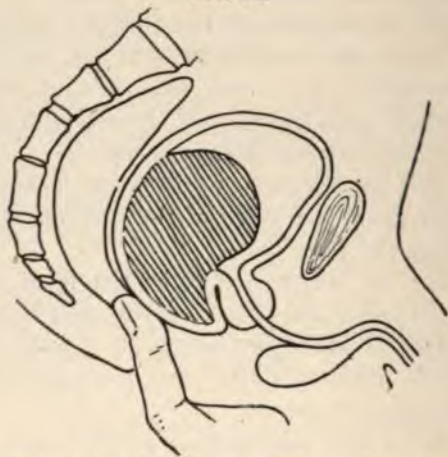
5. Vesical growth very rarely attacks and indurates the prostate, but hard prostatic carcinoma tends to break into the bladder.

Burial of the Prostate.—Large and soft vesical growths fill the bladder and depress the post-trigonal area, and thus obscure the outlines of the prostate.

Occasionally it will happen, when a large vesical growth occupies the bladder, that the finger will encounter an enormous mass in the region of the prostate, and that this gland will be supposed to be malignant. It should be remembered that very large soft growths of the mucous membrane may so occupy the cavity of the viscus that

they are literally pressed into the post-trigonal area, and overlap the posterior edge of the prostate; in fact, in some cases burying it almost entirely (Fig. 94).

FIG. 94.



"Burial of the prostate" by large vesical growth, so that on rectal examination the limitations of the prostate are lost in an uniform mass.

Thus Mr. J. Cashin, of Southsea, sent me a patient in whom I could detect no prostate at all, merely a huge, soft, even mass, occupying the position of that gland, and extending as far upwards as the finger could reach. Moreover, I could feel the bladder above the pubes extending half-way up to the umbilicus. This disappearance of the prostate was evidently not due to the pressure of residual urine, for I emptied the bladder of two ounces (its utmost capacity) by catheter before the rectal examination.

On supra-pubic cystotomy I found my finger in a cavity like a uterus containing the head of a child. I could sweep my finger between the large growth and the wall, and was able finally to locate a pedicle near the right ureteric area. I then tore out, piecemeal, a soft carcinoma weighing three quarters of a pound avoirdupois. After this

the prostate was found small, and the posterior wall soft and lissom. Patient was soundly healed by the third week.

Prostato-vesical Cuirass.—A burial of the prostate by a large removeable vesical growth is simulated slightly by a prostatic carcinoma bursting through its capsule posteriorly on to the back of the bladder and transforming the entire region which can be explored by the finger in the rectum into a projecting irregular stony mass of cancer.* Of course such a condition negatives any but soft instruments.

CLINICAL SKETCH OF THE TWO FORMS OF "BALD"
EPITHELIOMA.

(A) *The Early Infiltrating Group, and (B) the Tumour-forming Group which Infiltrates Later* (cf. Figs. 90, 91).

I believe that the early infiltrating epithelioma will be met with much oftener than the tuberos or tumour-forming epithelioma. In my own work 84 per cent. were of the early infiltrating type, and a questionable 16 per cent. formed masses of soft epithelioma, which projected into and encroached upon the capacity of the bladder.

(A) *The Early Infiltrating Epithelioma.*—Although I make it a rule to avoid cystoscopy, or, indeed, any instrumentation if definite infiltration is found on rectal examination, yet cases of this disease have frequently presented themselves for diagnosis in the very early stages, before invasion had become apparent to the finger, and from these I have gained some knowledge of the earlier appearances of the infiltrating group. Months after, many of these cases were found to have become infiltrated.

* Cf. Author, "A Clinical Study of Primary Malignant Disease of the Prostate Gland," *Edin. Med. Journ.*, July, 1899.

Cystoscopy.—In the very earliest period the cystoscopic diagnosis of this class is often very difficult. For instance—

A woman was sent to me in 1891 by Dr. Weakley, of Forest Gate, with a three months' history of cystitis. The capacity of the bladder was four ounces. The postero-superior and lateral walls had lost their sheen, and were covered with a delicate but distinct layer of mucus. The lower third of the bladder was distinctly altered. There was a patch of mucous membrane near the left ureteric orifice which was swollen and inflamed, and covered with a white phosphatic débris. "It is difficult," I wrote in the hospital notes, "to distinguish this from commencing epithelioma of the infiltrating type, but by turning the prism over on to its edge I see the border of the patch clearly. It has neither an upraised edge nor any rolled border; its surface is not eroded. I believe, therefore, that it is a patch of inflamed mucous membrane, irritated by the decomposing urine which is retained in a cystocelic depression which one can see at this part."

In May, 1894, two years after this examination, she returned to see me. The vaginal roof was infiltrated with malignant growth, and the patient's life for the intervening two years had, I learnt, been a period of constant and severe suffering. Nothing was attempted. She died on August 23rd, 1894.

If the cystoscopy is undertaken before the onset of cystitis the capacity of the bladder will be found somewhat diminished, but the greater part of the surface will be of a shining white, and the light will therefore be abundant. In front of one or other ureter, often encroaching on the trigone and creeping over its posterior edge, will be seen a *bald*, irregular, *nodular* growth of a dull red colour, similar to that of the inside of the mouth. It starts out in vivid contrast to the white colour of the posterior wall.

Three features may strike the observer. In the first place, the absolute sessility of the growth; then, its low elevation, the edge sloping off on to the adjacent healthy membrane; but more striking than these two aspects will be the cyst-like bodies which guard the edges or stand

out in crops from the surface. I find many expressions in my notes which are intended to carry some recollection of these little bodies. Thus, "cyst-like bodies, like a congenital cystic kidney in miniature, fringed one side of edge of the growth"—"many clear grapes in miniature"—"a double row of clear vesicles like miniature ranulæ"—"clear gelatinous nodules"—"myxomatous fingertips" (I have endeavoured to represent the condition in Plate VI, fig. 2). They are not solely characteristic of growth. I have seen them at the edge of tuberculous lesions, and regard them as evidences of lymphatic or glandular obstruction (cf. page 120).

Once the surface has ulcerated, and it does so *very early* in its clinical life, its aspect changes. The colour becomes more or less white in parts; thin films of mucus enwrap it; lizard skin cracks radiate here and there across the lobules. These cracks become filled with white phosphate of lime, and even a lobule or a group of lobules may be covered and concealed by a thick concave crust of greyish lime phosphate. This crust being loosened by ulcerative change falls on to the post-trigonal area, is swept away with the urine and passed. It should be recognised as an ulcer crust.*

Meanwhile cystitis has altered the character of the bladder surface generally. It is dull, of a deep red, it absorbs the light. Often the thick rugæ of the mucous membrane are tinged with blood, or smeared with mucus tracks as if a snail had crossed them, or they are plastered with white phosphatic deposit as if a limewash brush has been swept across them.

(B) *The Tumour-forming Group which Infiltrates later.*
—Should the growth be so situated on the posterior or superior wall (intestinal wall), or even on the lateral wall,

* I have often known these cup-crusts, and those flat crusts which are common to all forms of ulceration, whether simple, tuberculous, or malignant, to raise a suspicion of stone, and to subject the patient to frequent and severe soundings.

as to be well away from the region of the neck of the bladder, the tendency to indolency and to localisation is greater, and the resentment to instrumental interference is less. Its chance of pedunculation is greater and therefore its life is longer. The reasons are obvious, for the growth is away from the orifice of the bladder. Now the neck of the bladder is a forcing-house for growth. The tissues are less lax, and are therefore easily traversed by invading growth. The blood-supply is abundant, and is frequently augmented by the congestion of the straining efforts made voluntarily or involuntarily by the patient to evacuate the viscus. But there is a still more potent hotbed factor in the bladder neck. All irritating substances in the bladder precipitate towards the neck—the acrid pus, the products of decomposition, all septic organisms and their toxins,—all these chemically irritate and accelerate the growth. Hence it will be found that when the tumour is situated away from this fertile area it has a different aspect and clinical history, and probably possesses a longer life.

Visually and digitally two forms are met with which fall into the category of tumour-forming epithelioma, the one (A) tough and operative and offering a chance of some alleviation; the other (B) soft and partially removeable, it is true, but permitting of no real benefit to accrue from the procedure.

(A) *The Tough-superficial Growth; that which repays Operation.*

This, in its earliest stage looks like a hard chancre. It is usually *behind* the ureteric line. It appears as a bald, sessile, uneven plaque slightly raised above the surface, varying in size from a threepenny bit to a shilling. Parts of it are distinctly nodular. It is rarely of a reddish colour in its entirety. Here and there a tag or filament shows that an edge or patch is ulcerated, whilst a sprinkling of white or grey phosphate of lime denotes that destruction

is in progress. The area around the upraised edge may, as in other carcinomata, show clear cyst-like bodies,—evidences, I believe, of deeper change glueing the surface growth to the submucous layer. The neighbouring ureteric orifice is often swollen and pouting. If the finger is introduced at this stage the plaque will be found hard and definitely localised, and remarkably *moveable* on the subjacent layers. It can then be completely cut away with a sweep of the knife or scissors. Of course it recurs, and usually within a year to a year and a half. *If it is situated higher up* on the intestinal wall it gradually glues the layers together until it reaches the peritoneum. At this stage it can be removed by resection of all the coats of the bladder, including the peritoneum. As a rule such growths are tough, indolent, and isolated, and repay removal.* It may be that the epitheliomatous ulcer which I have specially described on page 212 is merely a stage of this hard-surface chancre-like growth, the centre becoming cupped by surface ulceration and interstitial contraction.

(B) *The Softer Tumour ; Partially Removable by Operation, but Rapidly Recurrent.*

The softer form of tumour formed by bald epithelioma is also more often found arising from the posterior wall behind the ureteric line. It is generally sessile, but may be thickly pedicled (3 per cent.). Visually it appears as a rounded mass, which varies in size from a walnut to that of a Tangerine orange. Its colour is white or greyish-white ; generally here and there are cracks like those seen in dried putty ; fibres, or clumps of fibres, hang from the surface, the result of maceration and necrosis, but there are no villous processes. The mucous membrane around is always red, gelatinous, and mucus-smeared. It is often possible to remove such a growth by “*morcellement*,” the tumour tearing like a turnip with very little bleeding ; but nearly always a thin base formed by the submucous

* Cf. examples of removal of such, p. 323.

and muscle layers glued together by infiltration will be left behind, and from this the growth will quickly recur.

Occasionally septicity softens the tumour, and pieces slough off and lie loose in the bladder. These may deceive the cystoscopist, for they simulate multiple deposits.

In some cases a very curious feature will be encountered, a condition which I do not remember to have seen noticed in the literature. It is the manner in which some of the softer varieties of growth spread over the bladder surface. Instead of growing out into the viscus like a turnip, some over-run and over-spread the entire surface of the base with a thin leaf-like layer of soft carcinoma, so that the finger can be insinuated beneath the leaf-like growth and peel it off with ease. This mantle of overgrowth is not apparently dependent on suckers dropped from the under surface, as one would be inclined to expect. It suggests that soft outrunners have been flattened by urine pressure against the wall.

CLINICAL HISTORY OF THE EARLY INFILTRATING AND THE TUMOUR-FORMING EPITHELIOMATA.

Any attempt to separate these two classes by their onset symptoms breaks down at once. Both may start with hæmaturia, for much depends on the softness of the surface change. The stages, therefore, are the same as those remarked in the benign and the villus-covered growths, — a latent stage, a stage of hæmaturia, and a stage of cystitis. This is contrary to the accepted teaching, for it is still taught that in cancer of the bladder hæmorrhage is a late symptom, an error which I pointed out in 1889.*

* From the time of Gross (1876) and his compeers the opinion has been held that hæmaturia is early in benign growth and late in cancer. It is depressing to notice how slavishly such statements are copied and recopied. Gross, in tabulating epithelioma and benign growth, notes:

Epithelioma.

Hæmorrhage occurs in 75 per cent. of these cases, usually as a late symptom.

Papillary Fibroma.

Hæmorrhage of constant occurrence, and often at outset and without obvious cause.

—Gross, 'Diseases of the Urinary Bladder,' third edition, 1876, p. 146.

The Latent Stage.—This stage is not only insidious, but probably more pronounced than in the benign group, for we often find extensive infiltration almost as soon as the onset symptoms appear (cf. page 298).

The Stage of Hæmaturia.—The age at which the onset symptom most often occurs is, on an average, half a decade higher than that which obtained in villus-covered cancer, viz. at 55—65.*

Symptomless hæmaturia appears as an onset symptom in 60 per cent. of all the cases. There is nothing remarkable about the onset of the hæmorrhage if it be *spontaneous*. There is nothing in its character to differentiate the malignant nature of the growth which gives rise to it, from the benign character of the simple papilloma which causes a similar loss. It usually disappears in a few days, to reappear and to become intermittent; but at first it is "symptomless." But if it be traumatic in its origin, if some indirect violence, such as a strain in lifting or a fall, start a hæmorrhage, it is different. Often an explosion of symptoms marks the traumatism of the growth—the hæmorrhage is severe, and it is followed in a few hours or *days* by symptoms of cystitis—pain, pus, irritability of the bladder—points which I shall refer to again in alluding to the stage of cystitis.

One marked feature is present, and this stamps the course of the hæmorrhage of spontaneous origin with a suspicion of malignancy; it is the rapidity with which other vesical symptoms appear. Within three months or six months from the onset of hæmorrhage, half the cases have entered the third stage—the stage of cystitis. The only exception to this evidence of rapid destruction of growth is when the tumour is situated well away from the base, on the posterior wall, or on the superior (intestinal) wall. Here a malignant growth may have a

* Et. 35 to 44 = 10 per cent. of the cases.

„ 45 „ 54	= 30	„	„
„ 55 „ 65	= 48	„	„
„ 66 „ 72	= 12	„	„

lengthier course, taking two to three years before entering upon the third stage (cf. page 305, B). Such, however, are rare, and only form 4 per cent. of the cases.

Two rules may be framed:—"The further away from the bladder neck, the more the surface only will be implicated, and the longer will be the duration of the stage of symptomless hæmaturia." Another can be formulated thus:—"The softer the surface growth, the more profuse the hæmorrhage will be, but the less pronounced the pain. The denser the growth, and the nearer it is to the base of the bladder the less the hæmorrhage will be, but the greater the pain."

Pain.—Before the hæmaturial stage is well over, ominous signs of infiltration appear, in the form of frequency of urination and pain. Frequency of micturition denotes that an area of the bladder surface is altered and "stiff," and that it thus resents the stretching of ordinary distension. There will always be some penile pain after urination but this is not characteristic. It is the "constant" pain in other regions which is independent of micturition which affords an important clue, both in diagnosis and prognosis. The practitioner should, therefore, be on the alert to note the position of the extra-urinary pain, as it is an evidence of nerve compression.

It will be frequently observed that in men the pain is at first *one-sided*: one side of the supra-pubic region, the inner side of one thigh, one groin, one hip, one loin (Figs. 95 and 96). In women it is frequently supra-pubic; in fact in this sex pain above the pubes is often an onset symptom.

Now these unilateral pains point to the position of the growth; thus, for example, right- or left-sided supra-pubic pain indicates growth starting in the corresponding ureteric area. When renal pain is superadded, it may be correctly surmised that the growth is extending around the ureteric orifice and adjacent channel.

Inner thigh pain, and pain in the obturator nerve area demonstrates that invasion is progressing towards the

prostatic capsule, and affecting the lymphatic glands near or at the point where the obturator nerve leaves the lumbar plexus—that the growth has, in fact, a trigonal

FIG. 95.

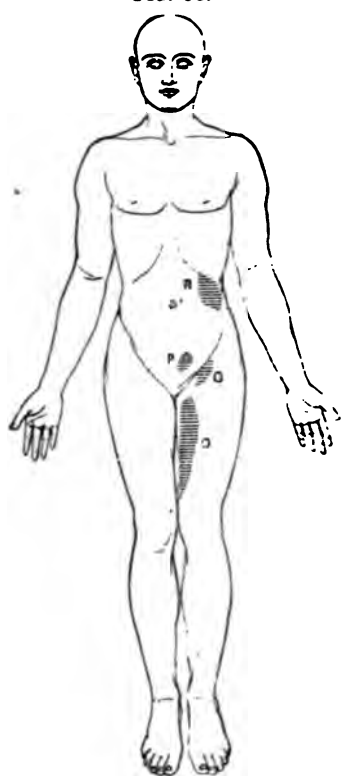


FIG. 96.

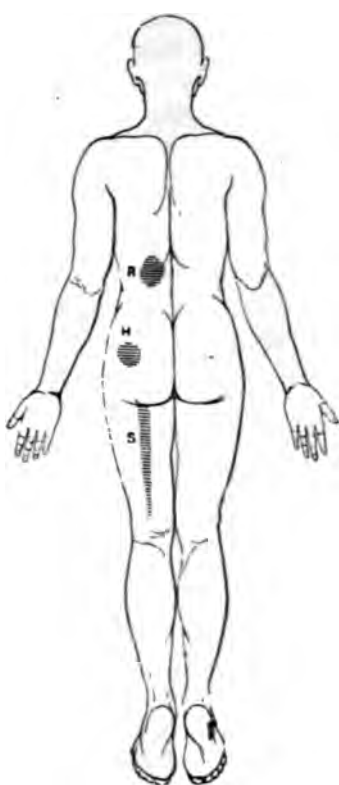


FIG. 95.—Shaded areas mark the positions of pain (renal, pubic, inguinal, obturator) felt in the advancing stages of hard carcinoma infiltrating the base of the bladder.

FIG. 96.—Shaded areas mark the positions of pain (renal, gluteal, and sciatic) felt in advancing stages of hard carcinoma infiltrating the base of the bladder.

or a circumtrigonal situation. With this is associated, either coincidentally or consecutively, a groin pain, from lymphatic extension to this region.

Hip pain (on the gluteal region above the trochanter) points to a lateral wall extension.

Sciatic pains point to a secondary deposit in the lymphatic chains around the sacro-sciatic foramina compressing the plexus.

These pains indicate infiltration, and are irrespective of those other pains, such as perinæal and urethral, which are due to direct pressure of the growth on the neck upon vesical contraction, or of cystitis.

It is important to note how frequently the patient is forced into the "painful" stage by sounding, or even by the use of a catheter, employed merely to test for residual urine. Very rarely, indeed, does instrumentation, except cystoscopy, afford the slightest indication of the nature of the disease. If infiltration can be detected *per rectum*, I hold that the employment of stiff instruments is not only unsurgical, but evidence of culpable carelessness.

Atypical Onset.

A small proportion of cases (30 per cent.) do not have the onset symptom of hæmorrhage, but commence their clinical history by irritability of the bladder, and supra-pubic or penile pain, irrespective of urination. As often as not, the pain appears first, either as a burning, stabbing, or shooting supra-pubic and groin pain, or a wearing pain in the back, and the irritability of the bladder is in some instances the result of the patient passing water to relieve the pain. Hence, two clinical facts are salient features in the early history: First, the pain is extra-vesical, that is, it may be in the groin, or inner part of thigh, as well as in situations pointing to the bladder, such as the supra-pubic region, or *side* of penis, or perinæum.

Secondly, the pain is constant, not dependent for its presence or accentuation on micturition—nay, it often is at first relieved by urination.

There is nothing much to be said about the frequency

of micturition except that it is persistent, that it occurs night and day ; that it is not accompanied at first by symptoms of cystitis (pus in the urine, or scalding along the urethra or glans penis after urination), unless the practitioner passes instruments ; and that it is not due to residual urine, for this is not large, 3j to 3ij, a fact which is suspicious of malignant disease in itself.

The duration of this initial stage is variable, often it lasts only a few months, but the third and characteristic symptom appears sooner or later in every case, namely hæmorrhage.

In 50 per cent. of these atypical cases hæmorrhage commences within six months of the onset, and the interval is rarely prolonged beyond the year. Moreover, it is noteworthy that with the appearance of the blood the extra-vesical pain diminishes, but the frequency remains the same. The hæmorrhage which occurs late in the case is very frequently *profuse*.

Sooner or later the third stage, that of cystitis, is entered, with its penile pain after urination, the increased frequency and urgency of the act, the muco-pus in urine, and the other distressing symptoms inseparable from the disease.

Note on Emaciation.

Noticeable loss of flesh generally appears before the cystitis. It may occur along with the earlier symptoms of the hæmaturial stage, and it then may be partly due to the loss of blood ; or it may appear in the earlier periods of the irritable bladder group, and be caused partly by the pain and broken sleep ; but when neither symptoms are marked, it is significant of hard carcinoma affecting the constitution by deteriorating the gastric and intestinal glands (Samuel Fenwick).*

The Third Stage of Cystitis.—I have mentioned that 60 per cent. of the cases enter their clinical life by presenting the symptom of painless hæmorrhage, also

* 'Medico-Chirurgical Transactions,' 1865.

that when induced violence splits the surface of a soft growth, not only hæmorrhage, but frequency of micturition and the penile pain of cystitis, ensue *at once* in a few instances. In other words, the damage evokes in a few hours an inflammatory condition which will remain until the termination of life. Not only does the rough use of a catheter or sound initiate this explosion, but even a hard motion, due to the exhibition of iron-alum or other astringent, may produce a precisely similar result.

Further, a certain proportion of the cases (10 per cent.) have no true hæmaturial stage at all, but plunge into the third stage at once—blood, frequency of micturition, urethral pain, and pus in the urine, all being noticed coincidentally.

The sufferings in the third stage are severe, often inexpressible. They are in direct relation to the *hardness* of the growth. The miseries of cystitis, of retention, of renal obstruction, of growth attacking the pelvic organs, all combine to form a picture of unrelievable agony. When the growth is very soft and rapid some suffer comparatively little. Even though the bladder becomes filled with soft growth, and the rectum invaded and semi-occluded, yet pain is, in rare instances, quite under the control of morphia. It would seem as if the sufferings in some cases terminated directly the nervous and muscular elements of the bladder are transformed into soft carcinomatous growth.

Incontinence of urine is favourable, in that when the restless energy of the bladder neck ceases the local sufferings diminish.

Typical cases.

Early infiltrating epithelioma.—The common type (60 per cent.).—J. S—, æt. 41. This patient was in perfect health until three months prior to seeing me, when blood suddenly appeared in the urine. It was symptomless, and subsided in two days. A month later it recurred. Six weeks after the onset a slight pain occurred in his right renal region, coincident with an attack of

bleeding. Three months after the onset he had another bleeding, but at this time great irritability of the bladder was superadded, and constant pain was complained of in the right kidney and right groin. Lying on his right side relieved the pain in the right kidney. The prostate was small; a hard infiltrated knot could be felt behind the prostate in the back of the bladder, a little to the right of the median line. The diagnosis I gave was infiltrating carcinoma pressing on the right ureteric orifice and adjoining tube, and I advised that it should be left alone. A surgical *confrère* performed supra-pubic cystotomy, kindly inviting me to be present. A hard sessile mass of epithelioma, not ulcerated, surrounded the right ureteric orifice. This was attacked with forceps, and partially removed piecemeal; it cut like an unripe pear, and proved microscopically to be epithelioma. The incision never healed. I heard that another operation was undertaken two months after to empty the bladder of a large fungating mass, and that the patient died three days later.

Infiltrating epithelioma commencing with frequency and pain.—The less common type (30 per cent.).—G—, æt. 68. Two months before seeing me he began to pass water frequently, and was also troubled by a constant pain along the inner side of the left thigh across the pubes up to the left loin. This was increased by micturition. He also had pain after micturition at under surface of the glans penis and in the left testis. Frequency of micturition was every hour in the day.

One month after onset blood suddenly issued in front of the urine, and he had to pass water every quarter of an hour in the day, and five times at night. He then had four or five attacks of bleeding and occasionally passed little flakes or clots of blood.

Present condition.—The stream of urine forms a weak parabolic curve. *There is a dense hard cake of infiltration behind the left lobe of the prostate.* The lobes of the prostate seem a little hard, but are not enlarged. There are no perceptible glands in the groin; no supra-pubic tumour. He was not sounded.

It was noted that the left side of the bladder, the left side of the trunk, and the left leg, are the most painful. Morphia reduced the frequency, but not the pain. Gradually left sciatica ensued.

Patient lost sight of.

Early infiltrating epithelioma.—A traumatic cause for the onset of symptoms.—J. S—, æt. 44. Three months before seeing me this patient, being in perfect health, was unloading a waggon of

dung. The fork, weighted with the material, slipped in his hand; his body was jerked, and he "heard" something crack in his left side, close to the crista ilii. He was in severe pain, and passed blood in large quantities with much clot. This was quickly checked. He soon began to have imperious calls to urinate every hour in the day and eight times at night. Pain was also experienced in the perinæum after the act, and he suffered from a dull constant pain in the left groin and left supra-pubic region.

On admission into the London Hospital the urine was acid, contained pus, mucus, and blood; sp. gr., 1011. The glands in left groin were enlarged and hard (carcinomatous). *Per rectum* the entire posterior wall was found densely infiltrated with nodular growth.

A colleague now saw him and performed perinæal section. A hard epitheliomatous mass was found covering the left base and the left posterior wall. He died shortly after.

Early infiltrating epithelioma (the stages being merged) (10 per cent.).—A stout, anæmic woman, æt. 58, was sent to me with this history:—Two and a half months before she suddenly passed a quantity of dark bloody urine painlessly, but next day severe pain and great irritability of the bladder set in. Pea-sized pieces of gravel (grey) soon appeared in the urine with mucus and matter.

When I saw her she was urinating every two hours; the urine was that of muco-cystitis; the capacity of the bladder was five ounces. Commencing epithelioma was visible at the left ureteric region. There was no infiltration to be felt *per vaginam*, but it was detected in a year's time. She died four years after onset in great agony.

ROUGH COMPARISON OF THE VARIOUS GROUPS OF VESICAL TUMOURS.

The Benign—the Villus-covered Epitheliomata—and the Bald Epitheliomata.

The periods of life which are apparently the most usual for the onset of the symptoms characteristic of these groups of tumours vary. The benign show their presence most often between 30 and 45, the villus-covered epitheliomata between 45 and 60, whilst the bald infiltrating group affect usually the age between 55 and 65.

The clinical history kernels itself into whether a growth is soft and easily lacerable or not, and whether it will block either ureteric or vesical orifice.

The onset symptom in all is generally a *symptomless* hæmorrhage; but the proportion of the cases in which this onset symptom occurs dwindles as the tumours become tougher—84 : 75 : 60 in their percentages.

The softer tumours have prolonged hæmaturial stages, whilst it is noticeable that in proportion as the tumours become denser, so the hæmorrhages are sooner followed by symptoms indicating destruction of growth or infiltration of the muscular layers of the bladder,—these

FIG. 97.



A typical villous papilloma with a thin stalk and an uninfiltated base.

symptoms being irritability of bladder and pain experienced in and away from the urinary tract.

Most tumours, whether benign or malignant, terminate

the surface of the breast is usually very smooth.

The mammary gland is composed of lobes and lobules. The lobes are separated by connective tissue. The lobules are the milk-producing units. The ducts of the lobules join to form the main duct of the breast. The ducts are lined by a single layer of cuboidal cells. The ducts are surrounded by a layer of connective tissue. The ducts are surrounded by a layer of smooth muscle. The ducts are surrounded by a layer of adipose tissue.

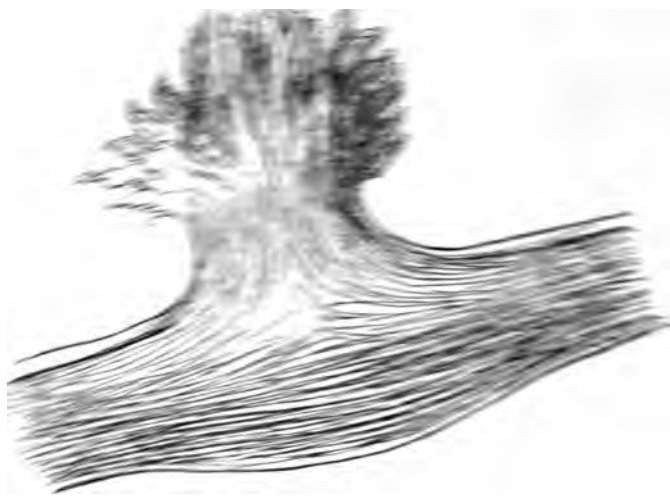


Fig. 1. Breast specimen showing the skin and glandular tissue. The glandular tissue is the mammary gland.

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	Benign villous papilloma.	Villous-covered malignant.	Bald malignant.
Age	Half the cases commence a decade higher; nearly half the cases half a decade higher, between 55 and 60.		
Onset symptoms	22 per cent. after 50. 84 per cent. hæmaturia 8 " impeded stream 8 " irritability	75 per cent. hæmaturia 15 " irritability 10 " impeded stream	60 per cent. hæmaturia 30 " irritability and pain.
Cause for onset sym- ptoms	Indirect violence, 6 per cent.	Indirect violence in 4 per cent.	Indirect violence, 31 per cent.
Character of onset hæ- maturia	Rarely severe, 6 per cent.	Very rarely severe, 2 per cent.	Commonly severe, 33 per cent.
Intermissions of health.	Common	Common	Uncommon, except in apical growths.
Fragmenta evacuated	Common, 33.9 per cent. Microscopy no indication of character	Less common, ? 17.2 per cent. Microscopy no indication of character	Rarely, unless the growth is septic and sloughs. Microscopy is diagnostic.
Character of surface	32 per cent.	32 per cent.	—
Fimbriated villous	8 "	18 "	—
Closely-packed blunt villous	8 "	18 "	—
Character of tumour			
Single	32	65	—
Multiple	8	35	—
Pedicle	72	47	—
sessile	28	53	3 per cent.
Digital examination of rectum with an empty bladder	No patch of hardening behind prostate	An infiltrated rectal wall rarely encountered except in the very last stage, but often there is the feeling of a "muscular" bladder or a "filled-up" bladder	Often encountered. Over 80 per cent. within 2 years.
Average life.	?	7½ to 8 years	2½ years, exceptionally 5½ to 7½ years.

OPERATIVE INTERFERENCE OF VESICAL TUMOURS.

This short sketch of vesical tumours will not be complete without a brief reference to their operative treatment.

The mere death rate in skilled hands is not great. Thus I have operated on vesical growth 135 times, and have lost nine patients. Two of these deaths I trace to a fault in my own technique—for my drainage was insufficient.*

I have also had to drain at least on ten occasions, leaving the growth alone. This low death rate is not due to that operative timidity which avoids all but easy cases. Some of the growths I have removed have half filled a gallipot; some have weighed, when fresh and cleaned of blood and *débris*, a quarter to one pound or more; some were the size of a man's fist, and so tough that they cut like softened cartilage. I have had in one or two cases to crush the bases with powerful clamps—my entire hand being in the bladder in order to guard the ureters and the thinned bladder wall. Moreover, I have resected large pieces the size of the palm of a hand with and without its peritoneal covering. In nearly all these cases the cystoscope and digital examination had previously taught me what I might do with benefit to the patient. For the question is not the safety of an operation, but

* *Deaths:*

K—, villous papilloma of 20 years' history. Exhaustion.

H—, villous papilloma. Insufficient drainage.

G—, villous papilloma. Insufficient drainage.

T—, malignant. Bleached and exhausted; died second week.

M—, malignant. Far advanced. Exhausted.

P—, villus-covered carcinoma; four times operated previously at St. Bartholomew's. Exhausted.

I—, caught cold some weeks after return home and died of pyelonephritis.

W—, female; villus-covered carcinoma; a recurrent case.

K—, villous papilloma; an old patient of Guy's; had attacks of uræmia in that hospital.

"Can the patient be benefited by operating? and will the procedure add to his tenure of life, or his comfort?"

I have no hesitation in saying that many of the operations which are undertaken for the cure of tumours of the bladder are useless, for they are not thorough. Nay, more, when only the surface of the growth is removed the operation is worse than useless. The "munching"—to use a phrase of Sir Henry Thompson's, who advocates the process—of a growth, whether it is benign or malignant, is not surgery. The growth must be cut away completely, *and the mucous membrane around its base, with it*, or the operation had better not have been attempted. Nothing less than such a radical operation in the benign tumour can effect a cure; whilst a "munching" operation on a malignant growth is tantamount to a rapid and exuberant recurrence.

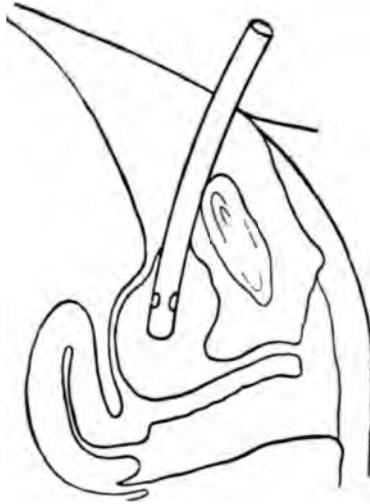
What are the guiding lines for operative interference? I submit—

First, that a radical operation, or even a cystoscopy, should not be advised in any case in which an infiltration can be felt *per rectum*; all such ought to be left rigidly alone. If the patient suffers from the terrible distress of an occluded vesical orifice, then supra-pubic drainage is the best that can be done. Perinæal drainage through a basal growth is provocative of severe pain and vesical spasm.

Secondly, if the cystoscope demonstrates a *single* villus-covered growth, and hæmorrhage is getting beyond control, or if unilateral renal pain is suffered from, or if corkage of the vesical orifice is present, let a *finger-sized* incision* be made supra-pubically and the base of the tumour examined. If it be soft, whether it be pedicled or sessile, I advocate that it and its area of attachment should be cleanly removed, the supra-pubic opening being in-

*The reasons why a finger-sized opening only should be made in the bladder need enumeration. Everything that is necessary can be learnt by a finger-sized incision. Many *large* growths can be removed through it, the opening being stretched, not cut. With so small a wound the patient generally passes water on the 14th day, and is dry on the 21st. Moreover the contamination from exposure of a big wound to alkaline puriform urine is avoided, exhaustion is not so frequent, and the death rate is greatly decreased.

FIG. 100.



Mrs. C—. Growth removed along with apex of bladder; peritoneal fold pushed back and stitched to posterior wall of bladder below incision.

FIG. 101.

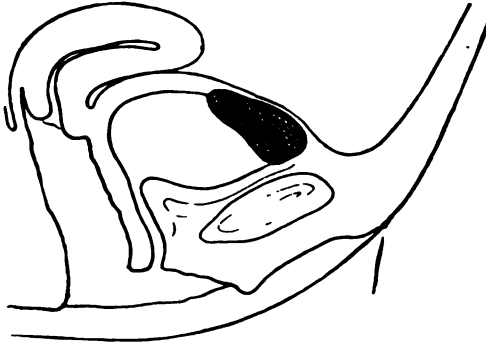


Mrs. C—. Wound healed; new apex of bladder adherent to suprapubic region.

Mrs. C—, æt. 65, was brought to me in October, 1899, by Dr. Harry P. Major, of Hungerford. The lady had been suffering from an intermittent symptomless hæmaturia for nine months. The urethra had been dilated by a gynecologist, and a "papillomatous tumour scraped."

On cystoscopy a large, bald, sessile, infiltrating epithelioma was seen springing from the apex of the bladder (Fig. 99).

FIG. 99.



A large, single, sessile epithelioma occupying superior wall of bladder at apex. Mrs. C—.

A supra-pubic cystotomy was at once performed, and the peritoneal cavity opened. The growth was found to have penetrated the muscular wall, and to have invaded the peritoneum. The entire growth was therefore cut away, and with it a big piece of the superior peritoneum-covered wall, a fair margin of apparently healthy tissue being removed along with the growth.* When this was done the big gap was repaired in the following fashion. The V-shaped wound in the bladder left by excision of the growth was approximated by means of stitches passing through the peritoneo-muscular layers of that viscus—a hole being left in front for drainage.

The peritoneal layer of the abdominal wall was cut a little transversely, loosened, and pushed down as the bladder was drawn up. The lower edge of the peritoneum was then united across the back of the bladder, below the lower end of the repaired V-shaped incision, so that in case of the bladder stitches giving way the leakage would be extra-peritoneal (Fig. 100).

* Growth in R.C.S. Museum, No. 3705 A.



PART III.



**THE CYSTOSCOPE AS A LOCALISER
OF DISEASE.**



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OF DISEASE.**

able, and that it supplies more information than the other procedures mentioned. Ever since the introduction of cystoscopy I have employed it systematically in renal diseases, and I have become more and more impressed with its diagnostic accuracy. I cannot help acknowledging that much of my confidence, and indeed that much of my success in renal surgery, depends upon it. I venture, therefore, to deal with it somewhat in detail in the following chapters.

The Importance of the Cystoscope in the Exact Localisation of Obscure Renal Disease.

Many clinical facts may be cited to show how difficult is the exact localisation of surgical disease of the kidney. Every one of the cardinal symptoms may be misinterpreted. For instance, to ascertain the true causation of renal pain is often an impossibility without the cystoscope.

A large percentage of local renal suffering originates in the bladder. As examples the following may be mentioned:—a vesical epithelioma narrowing the ureteric orifice, causing dilatation of one ureter and pelvis, produces pain in the corresponding kidney.* Septic inflammation ascending the ureter from a vesical source † induces renal

* *Examples.*—Mr. A., æt. 65 (vol. O. P. iii, 375), sent me by Dr. S. Fenwick, complaining of pain in left kidney, pain at left pubic spine, and in left side of penis. On cystoscopy a dense ring of non-ulcerated epithelioma was seen surrounding left ureteric orifice, which was red and gaping. I prognosed death from uræmia, and advised no operation. Patient did well for a year. He then consulted a surgeon, who diagnosed enlarged prostate and washed out the bladder. Death took place six days later.

Mr. W., æt. 60, was sent to me in 1899 by Dr. Kirkwood, of Peterborough, with very severe pain in the right kidney and along the right ureter. There was also much bladder irritation and pain. Pain had commenced fourteen years previously in the right kidney. He had been seen by Prof. Ziegler and diagnosed to have oxalate stone in the right kidney. Bladder irritability had been noticed for eight years. He had been repeatedly sounded for stone, but negatively. On examination with the cystoscope the right ureteric orifice was seen surrounded with a ring of dense carcinoma. This was contracting and closing the channel. A supra-pubic drainage, which was carried out eight months later, established the diagnosis of epithelioma of the right lower ureter.

† Such causes are too common to need illustrating.

pain; even villous papilloma, or ulcer near the lip of the ureteric orifice, gives rise to sympathetic unilateral kidney pain.* These, and other vesical disorders discoverable by the cystoscope, are so able to produce a one-sided renal pain as to mislead the clinician and divert his attention to the kidney from the real focus of the disease, which lies in the bladder.

Then, again, a fair number of cases of renal pain is due to calculus arrested in the lower ureter. This arrest can be surmised in some instances on using the cystoscope.

Conversely.—Renal disease may induce such agonising bladder symptoms as to deceive the most experienced physician. Unilateral renal tuberculosis descending the ureter, or chronic renal abscess, or descending pyelitis of calculous origin, or stone fixed in the lower orifice of the ureter,—all these induce difficulty of urination, great irritability of the bladder and penile pain; and yet each can be inferred, and sometimes accurately diagnosed by cystoscopy of the ureteric orifices.

Then there is a large group of cases which exhibit no symptoms to indicate the locality of the disease. Only blood or only pus or only chyle appears in the urine. Such symptomless hæmaturia, pyuria, and chyluria can only be successfully attacked after cystoscopy has demonstrated the source of the blood, pus, or chyle. It is sorry surgery to undertake a series of exploratory incisions in order to discover and treat an area of latent disease in a tract of so great an extent as the genito-urinary, when a simple cystoscopy is sufficient to reveal the site of the disease.

I have seen patients with symptomless hæmaturia and pyuria, who have had extensive supra-pubic operations performed in order to enable the surgeon to catheterise both ureters, and I confess that in several instances the procedure did not reflect any credit upon the surgeon, nor did it tend to elucidate the location of the disease.

Moreover, in certain instances an obstinate supra-pubic

* Compare examples, pages 188, 278, 431.

fistula was left, and the misery of the patient much increased.

Then, again, there is no doubt that the appendix in both sexes, and the pelvic sexual organs in women are fruitful sources of error in the diagnosis of urinary complaints. Often a right-sided descending calculus, or a movable kidney has been mistaken for an appendicitis, and *vice versa*, and many a time an inflamed ovary or an uterine fibroid has excited such marked vesical symptoms that the bladder has been energetically but fruitlessly treated, whilst the peccant organ has been left alone, and yet cystoscopy often proves sufficient to eliminate such sources of error.

The cystoscope also sometimes enables the surgeon to detect latent disease of the kidney, of which there has been no clinical evidence. Even obsolescent tubercle of the kidney may be inferred upon certain visual grounds, and much operative danger is thereby avoided.*

Lastly, there is a great field at present opening to the renal surgeon,—a field demanding skilled use of the cystoscope. I refer to the operative treatment of the earlier stages of chronic Bright's disease. It is contended by Newman, Harrison, and Edebohls that certain cases of albuminuria associated with casts and other evidence of renal degeneration have been benefited by operation on one kidney. The improvement has been noted on fixation of the organ (Newman), on relieving tension by cutting through the capsule (Harrison), and on decapsulation and inducing a collateral circulation (Edebohls).

Why such a result should follow operation on one kidney, in a disease hitherto regarded as constitutional and bilateral, is not explained.

I have proved and taught for years that changes analogous to, and indistinguishable from chronic Bright's disease are often not only unilateral, but are even localised to small areas in one kidney. If this disease has to be combated by operation, the affected kidney must be

* Compare chapter on "The Ureters in Renal Tuberculosis."

localised, and that can only be effected in the male by means of the cystoscope armed with a ureteric catheter.

Points in the Technique of Ureteric Meatoscopy.

1. The form of cystoscope.

There is no necessity to use any special cystoscope, still less to employ that recommended by instrument makers—the posterior wall cystoscope. Such an instrument is rarely of use. Let an ordinary anterior wall cystoscope be selected.

2. A *medium-filled bladder* is essential to success.

Let the bladder be filled comfortably with clear medium. Any over-distension flattens out the ureteric orifice and obliterates the lips. Half-distension causes the mucous membrane to roll up and the ureteric lips to thicken. Both extremes must therefore be avoided by the novice. With experience the effect upon the orifices* of over-distension and half-distension will be carefully noted, for valuable inferences may be drawn from such an examination.

3. The pelvis must be elevated.

It is necessary always to put a sand-bag or book under the pelvis. The amount of medium used for distension should be noted, and the height of the pelvic cushion employed in case of any re-examination.

4. The detection of the orifice. Let the cystoscopist be sure he is examining the ureteric orifice, for many and varied are the pitfalls.

When the cystoscope is felt to have entered the bladder let it be turned completely over by rotating the ocular end. Let the posterior edge or base line of the trigone be at once determined.

This is easily accomplished in moderate health, for the dark colour of the trigone marks it off sharply from the sandy white of the adjoining posterior wall, and its base line is upraised in the form of a slight

* These effects are best produced by a Nitze irrigating cystoscope.

ridge—"the plica ureterica." Variations in the colour of the trigone due to disease are recognisable without difficulty. Let the beak of the cystoscope be carried along the base line of the trigone, right or left, by moving the ocular end of the instrument laterally in the opposite direction. One ureteric mouth will come in view towards the narrow outer extremity of the base line—the "plica ureterica,"—the projection of which is caused by the fusion of the longitudinal muscles of the two ureters.*

The orifices vary in different individuals; women who have borne children have larger orifices.

In health and in moderate distension of the bladder the ureteric orifice is a faint flesh-coloured line. The low ridge on which it opens is of the colour of the buccal membrane of the lip: a twig of an emergent vessel may or may not be seen. If the bladder is distended to its full limits the orifice loses its line-like aspect. The lips separate slightly and become taut from the strain, an oblique depression appears, and it now resembles the opening of a Turkish slipper (Fig. 106). Moreover the colour of the lips changes to a white; the vascular twig disappears.

5. The position of the beak. It is a point of some importance to look *down* at the orifice, and not sideways. If the opening is looked at in profile, the cystoscopic lamp must rest on the posterior wall of the bladder, and if the lamp is kept burning a surface eschar is sure to be produced, which will mislead the cystoscopist in his just estimate of the case (*vide* page 340).

* As soon as the ureter pierces the outer and middle coats of the bladder its muscular coat, which is about one fiftieth of an inch in thickness, is thus disposed:—The more internal and strongest of its longitudinal fibres are directed transversely and join the corresponding fibres of the other ureter (the muscles of C. Bell) to form a low ridge, the plica ureterica, which makes the base line of the trigone, while the remainder are continued down over the trigone and blend with the sub-mucous layer. The circular fibres of the ureter appear as a kind of sphincter around the ureteric orifice.

Clinical Notes.

(a) *The diastole and systole of the ureteric orifice.*—The phenomena connected with the discharge of urine from the orifice of the ureter cannot be too carefully noted, for much information of the working activity of the corresponding kidney can be thus obtained.

Immediately preceding the efflux from an active, healthy kidney, the end of the ridge on which the ureteric orifice opens will generally swell, drawing itself up for an effort; a muscular wave passes then rapidly from without inwards over the tiny area, the orifice opens, a stream of clear fluid issues, mixing with the medium in the bladder just as glycerine mixes with water; the orifice remains patulous for an instant, then it contracts firmly, and its size diminishes considerably.

(b) *An absent ureteric orifice.*—In rare instances the ureteric orifice cannot be discovered, for it is absent.* This does not necessarily indicate a congenital absence of the corresponding kidney, but it certainly demonstrates that the corresponding kidney is a *useless* organ, existing may be as a shell.† The cystoscopist may be inclined to argue that because the corresponding renal region is the seat of continuous or intermittent pain, that the kidney must be secreting. This is a fallacy. Useless shell-kidneys ache though they may not secrete. They inflame and suppurate, though they may be shut off from all ascending infection from below. Compare (c).

* If the case be a male the surgeon should also see if both testicles are present. If one testicle is congenitally absent on the same side as the absent ureteric orifice, the chances are that the kidney is also absent.

† Now that side of the bladder which corresponds to the dead kidney is weaker than the other, and in two cases out of three it will rupture on this side low down if it is ruptured by violence. I believe the trigone affords a clue to this weakness. The ureteric bar is low, and flat on the same side as the useless kidney; the lateral muscle wall is thinned, slack, and baggy; but these are signs difficult of cystoscopic appreciation, and I cannot as yet rely upon them.

(c) *Hidden ureteric orifices*.—Ureteric orifices are difficult to find some months after nephrectomy has been performed, provided the lower ureter was not dilated at the date of operation. They are also "buried" in those bladders with basal swelling due to prostatitis.

(d) *A displaced ureteric orifice*.—If a kidney and ureter affected by chronic tuberculosis becomes inflamed, the kidney retracts under the ribs and the ureter shortens. In consequence of this the ureteric orifice gets pulled out of its place (*vide* pages 204, 499).

(e) *Extra-vesical termination of the ureter*.—Owing to some defects in development the ureter may not terminate at the usual position in the trigone, and in rare instances it has been shown to end in the posterior wall of the bladder. Commenting on such cases, Groszlik says, "In Civiale's,* Walther's,† Galaski's‡ cases, and in some others, the anomaly consisted in a supernumerary ureter which *coursed behind the bladder and ended directly at the colliculus seminalis*; the normal opening of the supernumerary ureter was situated on the floor of the bladder opposite the internal orifice of the urethra in Wrany's case.§ In the observations of Heller|| and Osterloh¶ we are, in fact, dealing with a supernumerary ureter ending blindly, but in both cases the ureters ran along the posterior wall of the bladder, while the blind ends did not penetrate the muscular layer of the bladder. An

* Civiale, 'Traité pratique sur les maladies des organes génito-urinaires,' 1841, Bd. ii, S. 467.

† Walther, 'Einige Krankheiten der Niere und Harnblase,' Berlin, 1800; cit. nach Englisch, "Ueber primäre Hydronephrose," 'Deutsche Zeitschrift für Chirurgie,' 1879, Bd. xi, S. 16.

‡ Galaski, 'Ein Fall von doppeltem Harnleiter mit getrennten Ausmündungen in der Blase,' Inaug.-Diss., 1869; cit. nach Englisch, l. c.

§ Wrany, l. c., "Autor veröffentlichte zwei Fälle, deren einer, als zu den von uns beschriebenen Anomalien gehörend, von mir in der Casuistik citirt wurde."

|| Heller, 'Deutsches Archiv für klin. Medicin,' Bd. v, S. 287; citirt nach Schwarz, l. c., S. 207.

¶ Osterloh, 'Jahrbuch der Gesellschaft für Natur- und Heilkunde in Dresden,' 1872-3; citirt nach Schwarz, l. c., S. 207.

analogous case was published by Meschede;* in this case the anomaly concerned a single ureter, the blind end of which was attached to the outer surface of the posterior bladder wall.

In the female the ureter has been known to end in the urethra, vulva, or vagina,† but these latter conditions, though they concern the urinary surgeon, do not engage his attention in cystoscopy.

(f) *Double ureteric orifice*.—This is a rare condition, but one of importance, as it not infrequently denotes disease in the corresponding kidney. The entire subject is treated more fully on page 361.

Clinical Note on an Absent or an Unrecognisable Orifice.

An absent or an unrecognisable ureteric orifice is a serious crux to the surgeon who contemplates operative procedures on the opposite side. He will obtain but little information if he adopts the expedient advocated by Knowsley Thornton of examining with the hand through a peritoneal incision the kidney whose ureteric orifice is

* Meschede, 'Virchow's Arch.,' Bd. xxxiii, S. 456; cit. nach Schwarz, l. c., S. 198.

† Kelly ('Gynecology,' vol. ii, p. 421) quotes a case of Dr. E. G. Orthmann, of Düsseldorf, in which the cystic dilatation of the lower end of a misplaced ureter simulated a vaginal cyst. The patient was twenty-seven years old, and presented a circumscribed cystic tumour of the anterior vaginal wall, which she thought was a prolapse of the uterus. This gradually kept increasing in size, and was associated with drawing pains in the left side, extending around into the small of the back. The tumour was elastic and circumscribed, and occupied the lower third of the vagina down to within a finger's breadth of the external urethral orifice. It could be pushed back, but returned on the least straining. Careful examination showed that it had no connection with the urethra or bladder. At the operation the thick walls of the tumour were dissected out up to a long pedicle on the left side, which was bared three to four inches, when it became evident, from the way in which the tumour emptied itself upwards, that there was a communication with the ureter above. The pedicle was tied and cut, and retracted into the cellular tissue out of sight. The convalescence was undisturbed.

Schwarz has written fully on these conditions, "Über abnorme Ausmündungen der Ureteren," 'Beiträge zur klin. Chirurgie,' 1896, vol. xv.

absent; for even *plump* kidneys* may be quite useless for the body need, or they may be so reflexly sensitive, that they may become suppressed in function upon the slightest shock. I advise a large dose of methylene blue and Contrexeville, and a re-examination of the apparently vacant ureteric area. If no blue efflux is seen the prognosis should be grave, and all operative interference on the opposite kidney should be gently purposeful, and stop short of nephrectomy.

A Few Difficulties.

(a) Occasionally the surgeon may deem the ureteric orifice to be absent, but hesitates to decide because there is much œdema or puffiness in the ureteric area. It is more than probable that the orifice is merely buried between two œdematous folds. Let a good dose of methylene blue be administered and the efflux will be stained, and the colour will lead to the detection of the opening.

(b) *Difficulty in saying which mouth is being inspected.*—If the base is looked at *sideways*, the knob on the ocular rim of the cystoscope must be noticed, for it points to the same side as the prism, and hence it indicates the ureteric orifice to which the attention is directed. The ocular rim must be *fixed*. Sometimes the entire cup becomes loosened and slides, and a grave diagnostic mistake can be made.

But if the orifices are being examined from above, that is, from a completely rotated cystoscope, and the prism is at some distance from the object examined, then especial care must be taken to be certain as to which orifice is under view, for both appear near together. This warning is not superfluous in cases of "symptomless" hæmaturia, for in these cases the surgeon is called upon to operate on

* I have on several occasions removed kidneys, large and healthy to the touch, the ureters of which were absolutely blocked by old fibroid change, and hard to the touch, the pelvis being a mass of fat and the cortex riddled with old abscess sacs containing obsolete tubercle or putty-like material.

one kidney upon the visual examination of the bloody ureteric efflux.

(c) *Changes in the size of the orifice.*—A certain amount of stress is laid upon the patency of the orifice—whether it can be “*looked into*,” so to speak. It must be remembered in estimating this that some orifices contract under stimulation of the light or heat of the cystoscopic lamp, or even from the character of the medium used to wash out the bladder; but the spasmodic closure passes off in a few minutes.

Under very deep anæsthesia—dangerously deep—the sphincter-like action of the orificial muscles becomes paralysed and the orifice gapes. The anæsthetist should be instructed to remove the mask for a minute, a watch being kept on the orifice.

(d) *A minute hernia or saccule simulating an open ureteric orifice.*—There is some danger of a novice mistaking a minute depression or the mouth of a tiny saccule at the side of the ureteric area for the open mouth of the ureter. In other words, the novice may diagnose a dilatation of the ureter when only slight sacculation of the postero-lateral wall of the bladder exists. If the rule of following the plica ureterica to either end, be adhered to, the chance of this serious blunder occurring is much lessened. It is moreover safer to wait for the efflux, for this removes all doubt.*

It is a point worth remembering that back pressure upon the bladder expends its force differently in different bladders. In some its effect is mainly noticeable in the bladder; in others in the ureters and pelves of the kidneys. This is generally admitted, but it is not realised that the *slightest back pressure, occasioned by the slightest*

* I have been several times exercised in my mind by the appearance of a thrust out and a suck in of the puriform contents of a little saccule. At each inspiration there has been a churning out of the puriform contents of a little diverticulum, and at each expiration blobs of pus and urine have rushed back. I mistook this at first for the efflux of an open dilated orifice, but it only occurs with respiration, and a “suck” back is rarely noticed into a patent ureteric orifice.

impediment to the urinary stream, even one so slight as to be unnoticed by the patient, produces visual hypertrophic changes in the bladder and ureters. The sequence of the *visual* effects of *slight* back pressure can be roughly formulated thus:—if back pressure is slight, it is compensated by changes in the urinary tract behind it. These consist, usually, either in slight sacculation and fasciculation of the posterior and lateral walls, or by the opening out and gaping of the ureteric orifices. If the bladder becomes slightly sacculated the ureters escape; if the ureters give way before the force, the bladder escapes herniation. Moreover one ureter gives way before the other ureter. And, curiously enough, the cystoscopist may notice one ureteric orifice patulous from back pressure and the bladder area around it free from fasciculation, whilst the other ureteric orifice is small,* and the area around fasciculated and sacculated.

If, then, we notice a small dark hole in the position of the orifice of the ureter, the rest of the postero-lateral wall is examined for the absence or presence of other saccules.

A Serious Fallacy.

Scorches with the beak.—Cystoscopists differ in their mode of examining the ureteric orifice. Some are content to view it laterally, and for this purpose they unwittingly lay the beak of the cystoscope on the posterior wall. A scorch of the surface almost invariably ensues† if the inspection be prolonged. Probably the cystoscopist now lifts the beak to examine the other ureteric orifice, and catches sight of the scorch erosion he has just made. Its reddened edge and greyish centre deludes him into believing the case is one of ulcerated bladder. The

* Vol. v, O. Per. 336, 311, 147.

† There is no reason why the bladder should be burned by the lamp. All that has to be done to avoid this accident is so to hold the beak that it is surrounded by water, and the heat evolved is carried off by the surrounding medium.

diagnosis being at fault, the treatment fails. It is no fancied pitfall. I have caused such erosions when demonstrating the orifice to a class, and I have seen it several times happen in the practice of others.*

One of the most annoying and serious mistakes I have made is worth placing on record. A male patient complaining of left renal pain was brought to me a week after a surgeon had cystoscoped him. I found a large, red-edged, sloughing ulcer situated to the side of the left ureteric orifice. I diagnosed a deep scorch with the lamp; but I noticed the adjacent ureteric orifice oedematous, large, protuberant, and gaping. It never entered into my mind that the propinquity of the scorch would cause such changes. I at once said, "There is a renal calculus two inches up the ureter," and passing my finger into the rectum I felt a rounded little body in the ureter, and another a little higher up. I immediately made a laparotomy, with separation of muscles, expecting to be able to slide the supposed stones up the ureter to the iliac fossa, and extract them through the incision used for tying the common iliac. My chagrin may be imagined when I found the small rounded bodies to be part of a chain of hard glands accompanying the ureter, and evidently enlarged by the same cystoscope scorch which had inflamed the orifice of the same. I promptly examined the kidney, found it small and very movable. I fixed it, and the patient was relieved of his pain.

Much of this danger is now removed by the use of the new "cold" lamp made by Lowenstein, of Berlin. It seems to owe its comparative lack of heat to being sheathed in asbestos.

* The symptoms of scorch erosion are penile pain for three days, slight and constant, increased at the end of urination, a slightly increased frequency of the act and a trace of pus, may be a tiny slough in the urine. It often takes three weeks to heal; but this, and of course the severity of the symptoms, is in proportion to the depth of the burn (*vide* p. 68).

the ureter. This may be sometimes found in the inter-ureteric muscles which form the plica ureterica. If then that half of the plica ureterica on which the ureter opens *appears* hypertrophied—that is, if it is seen to stand out as a bold ridge like a miniature biceps—a slight confirmation of the inference that the ureteric tube is hypertrophied is obtained.

In estimating hypertrophy of a plica it should be remembered that this ridge may be swollen by general inflammatory œdema of the base, in which case a glance at the trigone will serve to detect a general basal swelling; or the ridge may be thickened merely as part of a general hypertrophy of the bladder—a fact easily ascertained by comparing it with the opposite half of the ridge and the increased muscular mouldings of the adjacent posterior wall. Given, however, a thickening of *one* side of the plica, combined with hyper-activity of the orifice and an increased volume and strength of efflux, it nearly always indicates hypertrophy and slight dilatation of the ureteric tube.

The question of which the cystoscopist now seeks a correct solution is, For what is this hypertrophy needed? Is it to overcome a narrow ureteric orifice? If that opening is normal or large we should examine the ureter, for there must be some reno-ureteric cause for the hypertrophy.

Two clinical conditions present themselves as probable factors in the production of hypertrophy of the ureter with a normal-sized outlet.

(1) An increase of urinary work in the kidney. This occurs when the activity of the other gland is diminished or destroyed, and an abnormal volume of urine has to be secreted and ejected by a single kidney.

(2) Some body which the reflex sensitiveness of the ureter is labouring to rid itself of—particles of phosphate of lime or urates, or blood, or even a small prickly calculus, the clinical evidence of the last being reno-ureteric pain (not necessarily colic).

2. ABSENCE OF EFFLUX IN "HEALTHY" KIDNEYS ("DRY" URETER).

Sometimes no efflux will be noticed issuing from an apparently healthy orifice. It is unsafe to draw conclusions from this condition, which may be designated as "dry" ureter.

Kidneys often "rest" in the work of secretion. Moreover in some cases the renal secretion is very markedly under nervous influence. Thus fright, anticipation of pain, or exposure appears to inhibit the action, and the consequence is a dry ureter.

This is especially so in young girls about the age of seventeen. I have often had to make "surprise" examinations in order to note the ureteric efflux. Thus everything is prepared without the knowledge of the patient, Contrexeville water is administered, and the examination is rapidly carried out under cocaine,* otherwise the ureters may be found "dry."

3. THE EFFLUX.

(a) *A strong, rapidly-repeated efflux of a clear urine from both orifices.*—A very rapidly recurring jet, on both sides, the orifices being normal, usually denotes the previous exhibition of a diuretic or hyper-secretion due to disease.

(b) *A rapidly-recurring jet of clear urine issuing from one orifice*—and that being of large size and the other small—indicates a slight dilatation of one pelvis and one ureter from over-work, the other being deficient in activity.

Note.—A very active kidney generally has a slightly dilated ureter, a dilated pelvis, its secretion is pale, and of median specific gravity.

Such a kidney resents any shock, and if the operator is forced to interfere with it, he will do wisely to limit his exploration as far as possible to a digital examination †

* The exhibition of ether is best avoided, for this seems to curtail renal activity.

† Mem.: the fingers will discover a canoe kidney, that is one with a

of the unopened renal pelvis, and *without section* of the gland. Especial care is taken to examine the insertion of the ureter into the pelvis with the eye. It is often oblique.

(c) *Large-volumed, rapidly-repeated, opaque effluxes.*—The opaque effluxes temporarily obscure the light, but they are always a welcome object, for their volume indicates that the major part of the kidney is active. They are of three characters.

(1) A bloody-coloured efflux, of large volume and rapidly repeated, denotes a small pelvic source of hæmorrhage, an over-active, mainly healthy kidney, artificially stimulated by the blood or the cause for the blood, and a healthy ureter. One sees such a condition most commonly in the hæmaturia of chronic interstitial nephritis.

For examples *v.* page 385.

(2) A rapidly recurring efflux of muddy puriform urine indicates an over-active kidney, stimulated to increased exertion by mild pyelitis, and possibly by a calculus fixed near the ureteric orifice of the renal pelvis (*v.* page 450).

Mrs. T. G—, æt. 32, painless pyuria, had had bladder irrigated for weeks. Mud rapidly issuing in jets from a large ureteric orifice (right). Right nephrolithotomy; renal pelvis dilated a little; an oxalate embedded near orifice of same. Three months later occasional *quiet* efflux from right ureteric orifice; urine still a little muddy. Left ureteric orifice making efforts, but “dry.” Final health perfect.

(3) If the efflux is rapid, unilateral, and creamy white (the urine being chyluric), there is, in all probability, a communication between the dilated lymphatics of the renal pelvis and that reservoir.

M. C—, æt. 30. Chyluria with pain in *left* kidney. Creamy jet rapidly repeated from right ureteric orifice; flow rapid and profuse. The left not working; only occasionally a sluggish puff of clear urine. Mem.: cured by tabloids of thymol.

(d) A “*trickle*” *efflux* repeated at long intervals.

The urine issues slowly and scantily from the ureteric hollowed-out hilum. The sinus of such a kidney is easily and thoroughly explored by turning in the slack of the pelvis and feeling the calyces.

orifice in the form of a trickle. I never care to see this symptom for it denotes an inefficient kidney.

(1) *A puriform trickle.*—If it is a *pyuric* trickle the kidney is crippled by inflammation. The only favourable form is when the trickle is caused by the arrest of stone in the lower ureter (*q. v.*, page 477), in which case the kidney may recover part of its activity in time after the removal of the block to the channel.

(2) *A bloody-urine trickle* denotes that a small part only of a kidney, crippled by chronic interstitial nephritis, is acting, or more rarely that a deficient urine supply is passing over and washing a clot in the pelvis of the kidney.

(3) *A blood trickle.*—*A trickle of blood* denotes a slight kidney pelvis bleeding, the renal tissue being inefficient or replaced by growth.

(e) *Solid effluxes.*—Solid effluxes are always grave indications of pressure in the pelvis of an inactive kidney (either temporary or permanent). After clearing the orifice they break off in lengths according to their consistency, and these sections slide into the post-trigonal depression.

FIG. 102.



Cystoscopic diagram of blood-clot being forced out of right ureter.

(1) *Blood.*—When blood issues in clots from the ureter without any fluid efflux of urine (Fig. 102) it points to

profuse hæmorrhage of the renal pelvis; it is nearly always due to malignant growth breaking through from the cortex into the pelvis. *Vide* illustration, page 413.

(2) *Blood and débris* forming a solid efflux is rare; they are often grey in colour from the admixture of the necrotic material.

(3) *Pus*.—Solid tapes or rolls of white pus are indications of the secretory death of a suppurating kidney. This condition is so unusual that I append an illustration of it; compare other cases, page 464.

F. D—, æt. 33, had been treated by a “specialist” for an urethral discharge, which had appeared suddenly and, as the patient asserted, causelessly. The diagnosis of gonorrhœa was pertinaciously adhered to, but the prescribed injections did not remove

FIG. 103.



Cystoscopic diagram of a “pipe” of soft putty-like pus being pressed from left ureter.

the urethritis, nor had the medicine any effect upon the extraordinary *malaise* which the patient experienced. I was asked to see him, and noticed that his urine was acid, sp. gr. 1024, that it contained a quarter pus and was not tuberculous, that there was no pain, and no subjective urinary symptoms. His temperature was 100·5°. The left kidney felt slightly enlarged. He sweated profusely at night, and had lost one brother from phthisis. I placed him at rest and the pus suddenly ceased. It reappeared on his getting up again, but in lesser quantities. The temperature rose each evening, but the severest questioning could only elicit the

statement that he only felt "an occasional windy feeling in his left loin."

On cystoscopy I and several others saw a thick white pipe of inspissated pus being forced out of the left ureteric orifice. This was just like a slender tube of soft macaroni paste being pressed through its gauge. As it slid down the bladder wall—for the pelvis was raised—it arranged itself in coils like the rolls which treacle forms when dropped from a spoon (Fig. 103). I cut into the left kidney and released an abscess in the cortex containing six ounces of thick dirty yellow fetid pus. At the bottom of this abscess was the rounded opening of a deep calyx, and in the latter a curved "dirt stone."* The kidney never discharged any urine.

Clinical Inferences based on Marked Abnormalities in the General Appearance (Shape, Size, and Colour) of the Lower Ureteric Orifice and its Surrounding Area.

There is no doubt that in a certain proportion of cases of disease of the renal pelvis and ureter a distinct alteration in the shape, size, and colour of the corresponding lower ureteric orifice does ensue. I am sure that such changes are worthy of careful study, for they afford the surgeon a valuable indication to the site and sometimes to the character of the disease.

But I do not wish it to be inferred that the lower ureteric orifice *invariably* sympathises with the renal pelvis, or that it proves an infallible guide to renal disease; still less do I wish to convey the idea that the absence of any orificial change indicates a healthy upper urinary tract: I merely lay stress upon the fact that in a fair proportion of cases of disease of the renal pelvis the appearance of the lower orifice of the corresponding ureter will afford a valuable clue to the presence and nature of the disease.

The following axioms may be permitted.

(1) There is no doubt that the vesical orifices of the ureters differ in aspect in different individuals. But so

* Are these calcareous plates analogous to the fibroid cretaceous deposits found in healed phthisis? Are they evidences of chronicity in attempts at healing?

slight are the variations in appearance, that a type can be easily fixed upon to represent the normal.

(2) Abnormal appearances, if they are to be relied upon at all for inferential diagnosis, must be marked; nay, more, I think they should be *striking*.

(3) No expression of opinion concerning the abnormality of this or that urinary orifice should be accepted unless the skilled cystoscopist has examined and compared both sides.

Clinical Inferences.

A. A MARKEDLY VASCULAR ORIFICE DENOTES INCREASED VASCULARITY OF THE PELVIS OF THE CORRESPONDING KIDNEY.

The lips are normal in size, but the edge of the orifice is roughened, and the interior may be of a dull red, just as if it has been lightly smeared with dull red blood. Such a condition is frequently seen in *recent* profuse renal hæmorrhage—the hæmorrhage having ceased. It is not constant; some of the severest renal hæmorrhages have emerged from the healthiest looking orifices. The absence of this appearance, therefore, does not imply that there has been no recent hæmorrhage, it merely points to the absence of large clots, and the epithelial abrasion which ensues as they are extruded from the orifice.

Should *well-marked* vessel twigs radiate from the very edge of one vascular ureteric orifice, the inference that the corresponding kidney has been the source of the recent renal hæmorrhage receives corroboration.

Still more certain is it, if the lips and the corresponding part of the *plica ureterica* be slightly swollen and finely stippled with red (as in the early stage of acute urethritis), for in this case clots have passed along that ureter as well as fluid blood, and have, by their size, evoked a slight ureteritis. This last condition is clinically corroborated by the history of the patient having suffered from slight or severe renal pain or renal colic,

according to the size of the clot and the duration and difficulty of its transit along the ureter (for illustrations see page 407).

- B. AN ELONGATED TURGID ORIFICE LIKE A LONG CONGESTED MEATUS OF THE PENILE URETHRA, DENOTES DILATATION OF THE CORRESPONDING RENAL PELVIS, AND MARKS A TENDENCY FOR THE URETER TO DILATE FROM ABOVE DOWNWARDS.

If on contrasting two ureteric orifices it is noticed that one appears elongated, the lips swollen, and the opening a darkly congested furrow (Fig. 104), and not as normally obtains—a slit (Fig. 105), then the cystoscopist may infer

FIG. 104.



FIG. 105.



FIG. 104.—An elongated turgid orifice, indicating a dilatation of the corresponding renal pelvis.

FIG. 105.—A normal ureteric orifice.

that the pelvis of the former kidney is dilated,—it may be slightly or enormously, for the length of the lips of the orifice is no measure of the dilatation of the renal ureteric pelvis. The pelvis *only* may be dilated and the ureter normal, in fact, I have often seen the entire upper third of the ureter white and healthy to the eye, though the pelvis has been distinctly dilated and the vesical orifice of the ureter elongated and turgid.

I have found this condition most often in women, but that may be merely an error in numbers.*

It must, however, be remarked that cases of dilated renal pelvis exist without any alteration being noticed in the size of the corresponding ureteric orifice.

Hence the rule, I submit, should run as follows:

Marked elongation of the ureteric orifice,—the lips being turgid, swollen, and approximated and the orifice a furrow, denotes some dilatation of the corresponding renal pelvis, also that the urinary channel is probably beginning to dilate from the kidney downwards. The absence, however, of this particular shaped orifice does not denote that the renal pelvis is not dilated.

C. AN ORIFICE LIKE AN OVAL ARCH IS THE FIRST SIGN OF AN EARLY GRADE OF DILATATION OF THE URETER FROM BELOW UPWARDS.

Occasionally the cystoscopist will notice one ureteric orifice, even both, to be unduly large and white; the lips no longer exist as lips. The external commissure is raised to form an oval arch; the internal commissure is depressed to form the floor of the threshold of the channel. The orifice resembles in miniature the inguinal ring with its pillars, and the channel, which the eye cannot discern,

* *Examples:*

Mr. D.	Oper., iv, 160.	Left, a swollen, elongated lipped furrow. Left renal pelvis dilated, full of sarcoma.
Mrs. T. P.	„ v, 306.	Left, a swollen, elongated furrow. A dilated pelvis, appreciable to the finger; hollowed.
Mrs. E.	„ v, 242.	Left, a swollen, elongated furrow. A largely dilated pelvis.
Miss R.	„ v, 295.	Left, a swollen, elongated furrow. A largely dilated pelvis.
Mrs. G.	„ v, 310.	Right, a swollen-lipped, elongated furrow. Kidney moveable, hollowed.
Mr. F.	„ v, 331.	Right, a swollen-lipped, elongated furrow. Kidney slightly hollowed.

passes obliquely upwards under the arch. I believe this condition is one of the first signs of dilatation of the ureter, the orifice assuming this arch-like appearance when the bladder is very full and the pillars are stretched. The appearance changes a little in systole. As the pillars contract prior to the ejection of urine from the ureter the

FIG. 106.



"An arched" or inguinal ring-shaped orifice. The first sign of dilatation of the ureter.

oval assumes a round shape, and the colour becomes a duller red. It is often noted in those cases in which one ureter is giving way under back pressure, or in which there is only one kidney working for the needs of the body.* Pathologically it will be found that when one kidney is doing double work its entire ureter is dilated.

- * G. O. Per., iv, 509. Right ureter arched; pain occasionally along right ureter, lower third. Back pressure from enlarged prostate.
- | | | | |
|---------|---|---------|--|
| Mrs. C. | „ | v, 17. | Right arched. Right kidney doing all work. |
| E. | „ | v, 152. | Left arched. Left kidney the only kidney, and it was hydronephrotic. |
| Miss R. | „ | v, 376. | Left arched. The right was moveable and hydronephrotic. |
| Mr. N. | „ | v, 162. | Left arched. The right was moveable. |
| Mr. S. | „ | v, 163. | Left arched. The right not working. |

A





An open "golf-hole" ureteric orifice denoting dilatation of the ureter.

B



An ulcerated edged "golf-hole" orifice denoting dilatation of the ureter and pyelitis.

D. THE GOLE-HOLE LIKE URETERIC ORIFICE IS AN INDICATION OF A DILATED URETER (Pl. XIII, figs. A, B).

(a) *Non-inflamed*.—In some cases the ureteric orifice will be noticed to be distinctly open. The orifice is round, and the edge thick. The central channel being in shadow, will be black, but the lips have disappeared, and the mouth is so obviously open that the cystoscopist can almost hazard a guess what size catheter can enter the orifice without unduly stretching it. The opening may vary in size from  to , but it is not inflamed. The inference which may be safely drawn is that there is a fair degree of dilatation and atony of that ureter. If the edge of an open ureter is noted to be wavy or crenated in shape, it indicates a high grade of atony, but not necessarily a high grade of dilatation; in fact, the conformation of the ureteric orifice in any case is no guide to the degree of dilatation of the ureter, for that tube may be the size of a child's small intestine, and yet the orifice of the ureter may be only moderately patulous, and flaccid.

(b) *Inflamed and ulcerated*.—If, however, the edges of the patulous "holed" orifice are red, swollen, and excoriated (Pl. XIII, fig. B), pyelitis is obviously present, and it may be safely argued that destructive pyelo-nephritis of that side exists in addition to the dilatation and atony of the ureter. Here, again, the appearance of the ureter conveys no knowledge of the amount of destruction which has taken place in the kidney, nor of the working capacity of the gland. Generally such a kidney is useless, and it will not be advisable to leave it. One of the most striking cases I have had was sent to me in 1897 by Dr. Gordon Dill of Brighton and Dr. Ivers, of Tonbridge. The right ureteric orifice was the size of a 12 E catheter gauge, and out of it came an occasional clump of pus (Fig. 107). I removed a small kidney riddled with abscesses, evacuating at the same time a large abscess which lay between it and the liver. The ureter was a large slack open tube filled

with phosphatic *débris*. If the orifice is large, and the edge is of a dull white like inlaid wax whilst the surrounding area is reddened, the operator may expect to find periureteritis. In which case the ureter may be found transformed into a thick cord like a giant vas

FIG. 107.



An unusually large patulous orifice, denoting atony of pelvis and ureter.

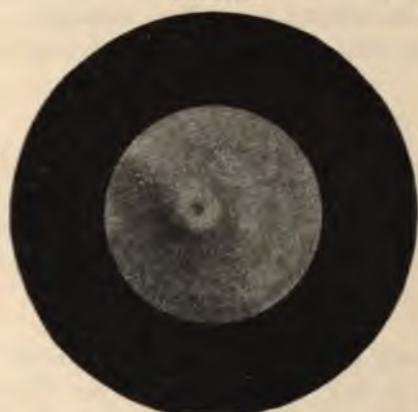
deferens, a condition which is typical of a rare form of reno-ureteric tuberculosis. This will be considered more particularly under the head of ureteric tuberculosis (page 488).

E. SMALL, PUCKERED, DISTORTED, WARPED URETERIC ORIFICES DENOTE PRE-EXISTING EROSIVE URETERITIS.

Occasionally an orifice will be noticed to be very small and irregular in outline, perhaps divided by a bridge of tissue into two minute holes. This is nearly always due to the scarring of pre-existing ulceration, and the ulceration is always the outcome of inflammation of the ureter or pelvis (Fig. 108). It might be thought that a small stone lodged at the orifice would cause ulcerative changes and subsequent distortion in the outline of the opening. This is a possible cause, but I have never met with it, for a prolonged retention of stone partly in and

partly out of the ureteric orifice is extremely rare.* Occasionally the puckered orifice will be red, a sure sign of recent acute attack of ureteritis or pyelitis. The adhesion of an ulcerated lip may be so extreme as to dam

FIG. 108.



A narrow orifice with a puckered, irregular outline, denoting a past stage of severe pyelitis.

back the urine, and thus lead to one form of so-called cyst of the ureter (*vide* page 365).

F. ORIFICIAL PAPILLOMATA MARK CHRONIC IRRITATING DISCHARGES FROM THE URETER.

Small papillomata or cockscomb warts, in size from that of a pin's head to that of a small pea, are but seldom seen on the lips or edges of the ureteric orifice. When situated at the orifice they are indications of irritation of a severe type in the corresponding ureter or kidney. It is especially important to note this because the surgeon is apt to consider the hæmorrhage complained of (for there is usually hæmaturia) to be of vesical origin, and advise removal of these sentinel warts. To adopt such a course will only prove disappointing, for the surgeon will be unable to remove such minute patches cleanly.† In the first place

* See cases of this, p. 474.

† Unless of course he uses a speculum and a strong head light.

ELECTRIC-LIGHT CYSTOSCOPY.

y be able to feel them, and if he scrapes
area haphazardly he will merely inflame, by
e ureter of the damaged kidney, and conse-
erate the disease of which the warts are only
the **terminal** expressions. I have known these sentinel
warts to occur in ureteric stone (four instances), in growth
of the kidney (two cases), and in chronic interstitial
nephritis.

A Fallacy.

The everted ring of mucous membrane in partial pro-
lapse of the ureter is nearly always tufted with isolated
papillæ, or distended bottle-shaped glands. These *look*-
like papillomata. They are mere evidence of œdema and
gland blockage.

G. **ŒDEMA OF THE URETERIC ORIFICE IS A SIGN OF STONE ARRESTED IN THE TERMINATION OF THE URETER, OR OF ACUTE DESCENDING RENAL TUBERCULOSIS.**

Œdema of the ureteric orifice is a difficult condition to
describe, but when seen its character is obvious and its
appearance is not easily forgotten.

The actual orifice is indistinguishable ; it is lost, buried
in a small irregular mound of œdema ; and as the light
strikes the side of the protuberance the rays trans-
illuminate the edge and show its colourless myxomatous
aspect to perfection. Here and there fine red striæ mark
the position of vascular twigs. Its position, its compara-
tive minuteness, its extreme translucency, the glisten of
the œdematous surface, and the fine markings or creases
which cover the convex surface should be sufficient to
prevent the cystoscopist from diagnosing villous growth.*
The condition is a rare one. I have met with it in
descending stone, when the calculus had blocked the
vesical section of the ureteric tube, and by its size had
interfered with the blood-supply (p. 472). I have also
met with it in acute descending renal tuberculosis (p. 511).

* I have seen cystoscopists fall into this error.

H. CONICAL PROTRUSION OF THE URETERIC ORIFICE AS A WHOLE USUALLY POINTS TO RENAL STONE WHICH IS EVOKING COLICS.

I have already drawn attention to the slighter forms of a protruding orifice under the head of ureteric cone, page 101; but it is necessary, for the sake of completeness, to allude to it here.

In certain cases of stone in the kidney there is very slight swelling of the lips, so that the orifice protrudes as a whole as an obtruncated minute cone. If the bladder is not fully distended the conical swelling is more marked. In the centre of the flattened apex will be noticed the open ureteric orifice. The light shines through the cone, causing it to assume the red colour of vascularity. The clinician will remember that the appearance is not common, that the "cone" is very small, that it must not be confused with the œdematous orifice, for this latter not only involves the orifice but the surrounding area as well; nor with eversion or rolling out of the mucous membrane of the lower end of the ureter, see below (I); and finally that when it is marked it indicates some focus of irritation in the renal pelvis, which will probably prove to be an aseptic stone.

I. PROLAPSE OF URETERIC ORIFICE.—THE MINOR GRADE CONSISTS IN MERE EVERSION OF THE URETERIC ORIFICE (Pl. XIV).

The cystoscopist will occasionally remark a little eversion of the mucous membrane of the ureteric orifice. It is a condition readily appreciated, and it may be noticed only during the relaxation of the diastole of the ureter, or it may be present even during the systole. It is analogous to the rolling out of a lax rectal mucous membrane in defæcation, and it may be construed as being caused by reflex expulsive efforts of the ureteric muscles to rid the tube of some irritant. I have met with it in several cases

of stone in the lower ureter. In the minor grades it may right itself spontaneously in the course of months; thus in one case, a male patient, in whom the prolapse was severe and the eversion about an eighth of an inch in length (Pl. XIV), a spontaneous cure was noted and maintained for a year.

Ureteric prolapse (like the rectal eversion in a horse after defæcation); entire recovery.—H. L.—, a young soldier æt. 20. Sent to me by the late Staff Surgeon H. Jackson, in January 1898.

A four months' history. Onset: diurnal frequency and glans pain after micturition; then nocturnal frequency; then a quantity of blood towards the end of the act. Since this attack the hæmaturia has recurred at intervals. Exercise had no appreciable effect on the pain or blood. There was no lumbar or groin pain. He noticed that his urine stream stopped suddenly. Urine 1018, acid; pus; no tubercle, no testis or prostatic tubercle.

Cystoscopy.—Orifice of left ureter a swollen, tumid ring of prolapsed everted mucous membrane, exactly like the anus of a horse after defæcation. From the centre of this, where the orifice would be, issued a white thread of pus, which overlapped the ridge and fell on to the inter-ureteric bar and trigone. No other pathological change in bladder. Cause of condition unknown. To be placed on hexamethylene tetramine, gr. v, ter die, for three months.

Cystoscopy.—March, 1898.—No prolapse. Orifice sound and small.

Report: March, 1899.—In good health.

March, 1900.—In good health.

March, 1901.—Lost trace of patient.

J. PROLAPSE OF THE LOWER URETER, THE SEVERE GRADE.

Cases are on record in which the eversion and prolapse of the mucous membrane of the ureter through its orifice were so marked as to deceive and tempt the surgeon to ligate the protrusion in the belief that it was a vesical growth. Thus Mr. Davies Colley* reports the case of a female infant aged eighteen months in which such an ureteric prolapse was found.

* 'Path. Trans.' vol. xxx, 1879, p. 310.

A



B



Eversion of the ureteric orifice (seen from in front and from the side).



A soft mass of a dingy reddish-purple colour, about one inch long and half an inch thick, was seen protruding from the vulva. The child had been lately noticed to strain a good deal on making water. The flaccid reddish protrusion was readily unfolded, and ascertained to be the shape of a funnel, the neck of which was placed within the urethra. The aperture of the funnel formed a circle one and a quarter inches in diameter; its neck, which lay within the urethra, was not quite half an inch in diameter, but when it was not upon the stretch, it shrank to so small a size that it did not fill up the whole of the urethra, which was not unusually large. The edge of the funnel was about an inch distant from the meatus urinarius, except posteriorly, where there was an interval of half to two thirds of an inch. The walls of the funnel were nearly a quarter of an inch thick, soft, shining, and of a reddish-purple colour, and resembled in appearance congested omentum. A probe could be passed into the bladder through the meatus, and could then be moved nearly all round the neck of the funnel, but not quite, from which it appeared that a part of the funnel grew from the posterior wall of the urethra. The little finger was introduced into the vagina, and the os uteri could be felt in its normal position. A female catheter was next passed into the funnel. It went up about five inches towards the left side of the abdominal cavity, and gave exit to four or five ounces of very fetid pus. The catheter was introduced into the urethra, and drew off about two ounces of clear, inodorous urine. The neck of the protrusion was ligatured, and the mass cut off. The child died nine days after. Autopsy revealed that the mucous membrane which surrounded the orifice of the left ureter had prolapsed, probably under the combined influence of a renal calculus and great straining, and had been ligated and removed.

I do not know of any case of severe prolapse of the ureter being diagnosed by the cystoscope and operated upon. It is true that one or two isolated cases in the male are to be met with in the literature, labelled "prolapse of the ureter," and that recent authors have accepted the diagnosis without question, and have quoted the *causa*, but careful analysis of the description rather disqualifies the term of "prolapse."

Several of the so-called "prolapsed ureters" are evidently due to ballooning of the ureteric orifice—the so-called cystic swelling of the lower ureter, a condition very

dissimilar to prolapse. I have entered into this subject somewhat fully in the next chapter, page 366, but I may mention here that it consists in the appearance of a long, finger-shaped, cyst-like mass from the position of the orifice of the ureter, that the orifice is pin-point in size, and therefore bulged forward by the pressure of urine behind it, that the swelling is usually of a pale grey or glistening white, being composed of thin mucous membrane, and that not infrequently small stones are found in the cyst or in the ureteric tube. It merely needs cutting off, and this may be done without *danger*, but a true prolapse is very different. Here the orifice of the ureter is *large*: the ureteric mucous membrane slips through and turns inside out. If it is cut through to any great extent the tube may retract, and subperitoneal or peritoneal extravasation of urine ensue.

CHAPTER XIX.

RARE ABNORMALITIES IN THE TERMINATION OF THE LOWER SECTION OF THE URETER.

CERTAIN rare conditions, principally of congenital origin, which affect the lower orifice of the ureter have now to be considered. They will only be met with occasionally in cystoscopy, but their recognition is of importance in the conservative surgery of the kidney. The following three rare abnormalities merit a brief notice. The ureter may be double throughout its course, and it may then terminate in two orifices, a double patent orifice; or, secondly, one of these canals may end "blind" under the trigone, and then it will dilate into a cyst, which will mark and complete its end; or, thirdly, one of the ureteric orifices may be so minute that the pressure of the urine on the lower section of the tube swells out its termination into a bulb or cyst, the so-called "cyst of the ureteric orifice."

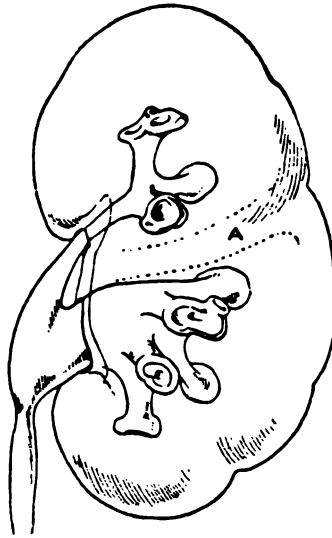
A Double Ureteric Orifice; Twin Ureters (both Patent).

Two ureteric orifices on one side will be rarely encountered; when this condition is met with it should at once engage serious attention, for the chances that the corresponding kidney will be found affected by inflammatory changes are great. A few words relative to the anatomy of this condition are perhaps necessary. From a surgical standpoint, says Max Brödel,* all forms of kidney pelves may be classified into—(1) true pelves, with major and minor calices; (2) divided pelves where there is no free communication possible between all the calices inside the kidney.

* Max Brödel, 'Johns Hopkins Hospital Bulletin,' No. 118, p. 10.

The kidney with the divided pelvis is not often met with. As a rule it preserves its foetal lobulations, and has an abnormal arterial circulation; the division between the individual sections of the pelvis is generally marked on the surface by a deep groove (Fig. 109), thus causing the appearance as though there were two separate kidneys, one on top of the other. Frequently they are indeed separate organs, as far as their secretory function and their arterial circulation are concerned. The divisions of the divided

FIG. 109.

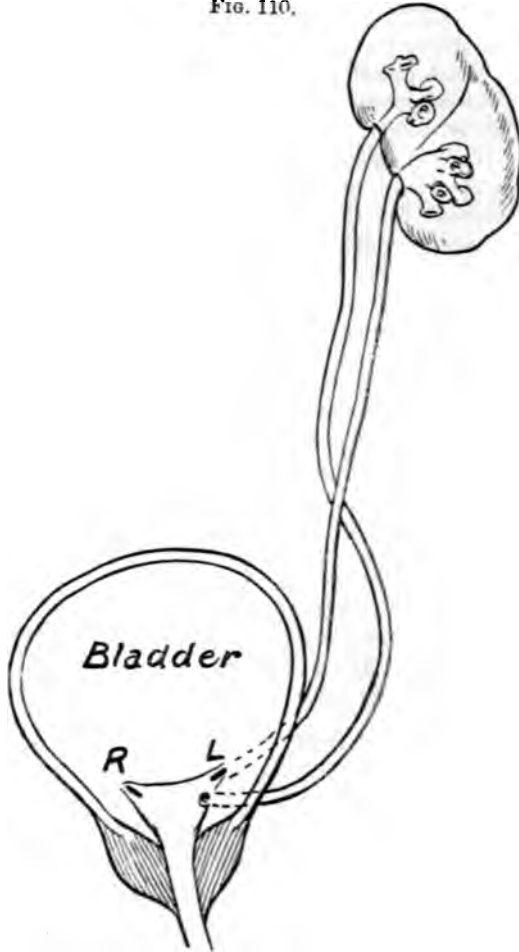


Left kidney with typical form of divided pelvis. The two divisions of the pelvis are separated by an area of cortical substance, A. (Max Brödel.)

pelvis generally unite into a common ureter (Fig. 109). In rare instances, however, the divided pelvis has corresponding ureters, and the double ureters enter the bladder near the usual site. But a careful examination of the scanty literature of double ureter will show that there is a rule for the position of the twin orifices, and this to the cystoscopist is of some importance.

Thus the ureter draining the upper and smaller part of the kidney opens lower in the trigone than the ureter

FIG. 110.



Author's case, to depict rule for position of the opening of double ureters.

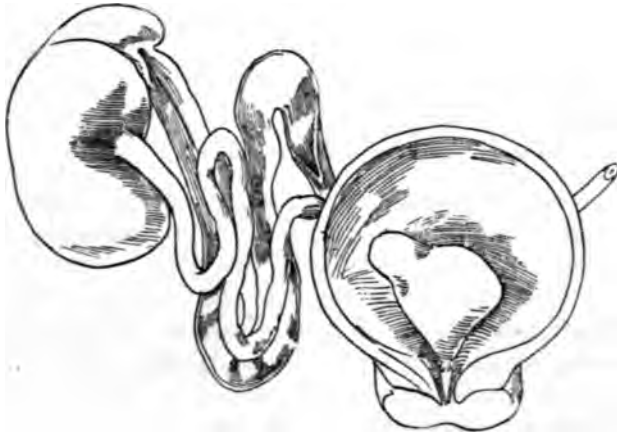
draining the lower and larger section of the kidney (Fig. 110). The question is more fully dealt with on page 364, in which cystic termination of the lower ureter is discussed, but at present a case which occurred in my

1. *Introduction*
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 5. *Discussion*
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aged 65 who had died of typhoid fever, and who had suffered from retention of urine during the last few days of his life. Although Lilienfeld did not correctly interpret this case, yet the description permits of the case being classified as an instance of the blind termination of a supernumerary ureter (Grosklik).

No changes in the left kidney and the corresponding ureter. At the apex of the right kidney was found a formation resembling a supra-renal capsule in form and size. It was intimately connected with the kidney, and filled with brown fluid; its walls were covered on the inside by a thick layer of calcareous deposit.

FIG. 111.



Lilienfeld's case of cyst near orifice of double ureter. The divided kidney-pelvis, and double ureter are shown. One ureter ended at normal position, the other—the supernumerary—terminated in a blind cyst which projected from under the trigone.

At the inner and lower surface of this formation arose a blind tortuous canal which led towards the bladder, together with the ureter, issuing from the kidney (Fig. 111). The normal ureter then pierced the bladder wall in the usual situation, while the other canal did not communicate with the bladder, but opened into "another little bladder"; the latter lay in the region of the trigone, and partly overlapped, by means of a small outgrowth, the opening of the neighbouring ureter. The little bladder became gradually narrower downwards, and its apex reached the verumontanum.

Both "little bladder" and tortuous canal were filled with a brownish fluid. Both surfaces of the "little bladder" were covered by mucous membrane, between which a few muscular fibres were found in the connective tissue. The "little bladder" ended blindly and did not communicate with the urinary bladder.

Eppinger* describes the case of a man aged 22, in whom the lower segment of the ureter had pierced the bladder muscle in the usual situation, and ran beneath the mucous membrane in the direction of the ejaculatory duct, with which it communicated along the corresponding lobe of the prostate. The ureter for the whole length of this track formed a cyst with thin transparent wall, which was covered in front by mucous membrane, and was backed behind by the muscular coat of the bladder.

Ballooning of the Ureteric Orifice (so-called "Cyst" of the Lower Section of the Ureteric Tube).

Somewhat allied to the prolapse of the ureter in appearance, but differing from it in its causation and treatment, is the so-called cystic distension of the lower segment of the ureter—a condition which is dependent on the blind termination of that canal or on congenital narrowing of its orifice. Occasionally the lower orifice of the ureter is extremely minute, set in the side of a hard, fibroid, pea-sized mass, so small, indeed, that it only admits the point of a pin. If the urine from the corresponding kidney remains sterile, the force which is exerted by it is at first expended upon that section of the ureter which traverses the vesical muscle, and especially upon the thin and lax, mucous-membrane-covered orifice. This part gradually acquires the form of a bottle, the base of which is at the ureteric orifice. Gradually the mucous membrane is thrust out, the bladder in the form of a globular cyst. The appearance varies according to the thickness of the wall. It may be extremely cystic

* Journal of Surgery, 1891.

for it may have that glistening pearl-grey appearance so characteristic of fluid inside of a fibrous envelope, but usually it is of a reddened mucous membrane colour. It is distinguished from prolapse by its shape. A section of this cyst-like structure shows it to be lined inside by the mucous membrane of the ureter, whilst its external layer is composed of the lining of the bladder.

The condition, in fact, reminds one forcibly of the ballooning of the prepuce during urination in a boy who has congenital phimosis of a severe grade. I submit "ballooning" is the proper term to use for this abnormality, and that the designation of cyst is not only inappropriate, but misleading. One of the earliest and best illustrations of this abnormality is recorded by Sir Thomas Smith* in 1863, under the title of prolapse of the ureters into the bladder.

A man, apparently the subject of stricture, perinæal fistula, and pyuria, was operated upon by Sir James Paget, and died with symptoms of uræmia.

On opening the cavity of the bladder, which was much hypertrophied, one or two mucous sacculi were found protruding outwards between the muscular fibres. The vesical ends of both ureters were found to be prolapsed, forming pendulous pouches, into its cavity (Fig. 112). The openings of the ureters were reduced to mere pin-hole apertures situated on the most prominent part of each pouch (through these bristles have been passed in the specimen). The pouch formed by the left ureter was the larger; that formed by the right enclosed a stone about the size of a cobnut. The ureters were each about an inch in diameter, and their walls were greatly thickened; the kidneys were enormously dilated, being each about nine inches long; their secreting structure wasted, and their distended pelves containing purulent urine. The left kidney had within it two irregularly shaped calculi.

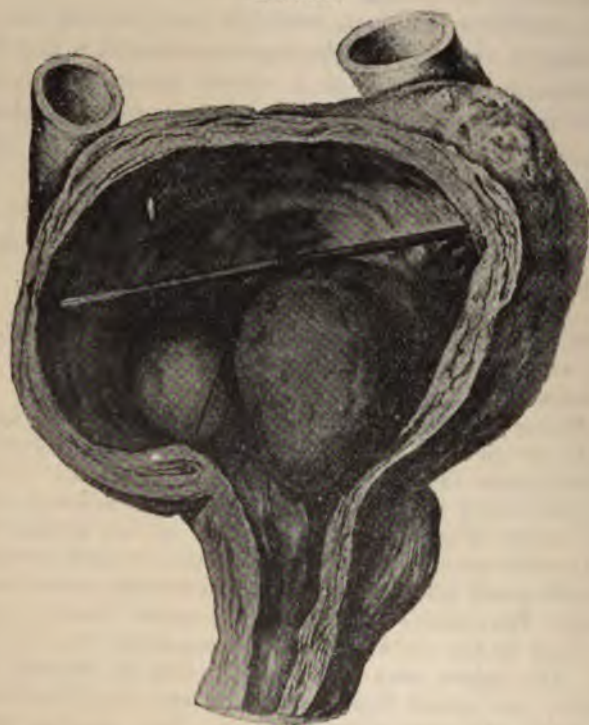
Dr. Burckhardt, of Basle,† has met with a similar double

* Cf. St. Bartholomew's Hospital Museum, No. 2367; 'Path. Trans.,' vol. xiv, 1863, p. 185.

† Burckhardt, 'Centralblatt für allgem. Pathologie und pathologische Anatomie,' Bd. viii, No. 4. A man æt. 62, who had died of pneumonia

protrusion of the lower ureteric segment, but with these two exceptions the literature only contains unilateral affections. I have on four occasions met with this condition on cystoscopy. In every instance there was no hesitation about the diagnosis; the globular protrusion in each case

FIG. 112.



Sir J. Paget's case of cysts of ureteric orifices, recorded by
Sir Thomas Smith.

being obviously ureteric, also pale, white, and cyst-like in aspect. My first case was that of a lady aged forty-seven, brought to me by Dr. Bower, of Hendon.

and heart disease. Both ureteric orifices were narrowed and formed cystic swellings.

She suffered from grinding pains along both ureters (? colic), and extreme agony along the urethra after micturition, the act being frequent. There was much pus in the urine, but it varied in amount, as pyelitic pus usually does.

On cystoscopy I found the right ureteric orifice ballooned to the size of a large *white-coloured* walnut (Fig. 113). The left orifice

FIG. 113.



Author's case of ballooned right ureteric orifice.

was not enlarged. I first explored the left renal pelvis, finding it slightly dilated by a narrowing at its outlet. The ureter was healthy.

The right renal pelvis was then opened. It was markedly dilated, the pelvic wall was much thickened, and the upper ureter dilated. The middle section of the ureter did not seem enlarged; a bongie was passed along it to the bladder. No stone was present.

Finally the ballooned protrusion of the right ureteric orifice was cut off with cutting forceps introduced through the urethra, so as to allow free drainage to the right kidney. The lady recovered rapidly and completely. The empty sac-like protrusion looked red after it was removed, and could be slipped over the terminal phalanx of the thumb like a glove; the orifice was towards one side and pinholed.

July, 1900.—Free from all symptoms and well.

July, 1901.—Free and well.

April, 1902.—Free and well.

This demonstrated to me that only one ureteric orifice may be affected; that stone in the kidney was not of necessity an accompaniment of the ballooning, and hence not the cause of the protrusion.

J. S.—, *æt.* 51, was brought to me for difficult urination, sudden arrest of stream, and pelvic pain during the act. His history was as follows.

Sixteen years ago an attack of painless hæmaturia. Ten years ago another hæmaturial attack. Then gradual pain in right kidney. Recurrent attack of difficulty in micturition. Sudden stoppages in the stream; finally retentions, which have to be relieved by catheter. The right kidney was feelable and tender. No stone could be detected (X ray), but on cystoscopy a very remarkable condition was revealed. The bladder was finely trabeculated, but strikingly white and healthy, except in the right ureteric area. Springing from the area of the right ureteric orifice was a finger-shaped mass about one and a half inches long (Plate XV). The cylinder was of a pale pink; it was covered with mucous membrane, on which could be traced marking of trabeculated muscle. I cut it off through a supra-pubic opening. No stone came down the ureter. He recovered promptly.

I saw my next case with my colleague, Mr. Harold Barnard.

A man *æt.* 33. He was suffering from occasional attacks of hæmaturia accompanied by pain at the end of micturition. The blood appeared at the conclusion of the act, and was due to "forcing out something." The pain was of a scalding character along the urethra and at the left external abdominal ring; the stream had occasionally stopped in the middle of the act. The left ureteric



Cystic distention (ballooning) of ureteric orifice simulating
Eversion and prolapse of the lower ureter. (Author's case.)
Combined cystoscopic view.



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orifice was protruding in a sac-like form (ballooned), about the size of a monkey-nut. It was interesting to notice how erect and distended and pale it became as it filled after each ureteric peristaltic wave, and how it slowly collapsed as the urine escaped into the bladder from the pin-point hole. The patient improved as the cystitis subsided.

Six months later he pronounced himself "cured."

I was enabled by my colleague, Mr. Swinford Edwards, to examine a fourth, and a very typical case in a man æt. 45. He had been suffering for seven years with a right lumbar pain, and latterly had irritable bladder and penile pain. A stone could be felt *per rectum* high up in the right ureter. It came through into the bladder after the cystic bulging had been cut off through a supra-pubic wound.

Mr. P. J. Freyer reports a case* in which cystoscopy "revealed a smooth tumour, the size of a walnut, with thick rounded pedicle, growing from the right side of the base of the bladder."

Supra-pubic cystotomy was performed. The tumour, the size of a walnut, smooth on the surface except at the apex, where a small papilloma was growing from it, was attached by a round tense pedicle to the bladder wall near the right ureteric opening. On twisting off a portion by forceps and then drawing the tumour into the abdominal wound it was found to be cystic, and contained two uric calculi, one the size and shape of a nutmeg, the other the size of a large pea, the two weighing 42 grains. The patient did well.

Another operation case is that of Dr. Groszlik,† contained in an able lecture on the subject delivered before the Warsaw Medical Society, February 26th, 1901, and from this communication I have obtained additional facts relating to the subject.

* "Obscure Cystic Tumour of the Bladder containing Two Calculi," 'Trans.' Royal Medical and Chirurgical Society, Nov. 9th, 1897.

† Groszlik, "Zur Kenntniss der angeborenen Harnleiter-Anomalien," Casper's Monatsberichte 'Urologie,' Heft 10, p. 577, 1901.

His case is as follows.

A man *æt.* 39 had sudden diffuse pain in the right hypochondrium, which became rapidly worse and gradually affected the right half of the abdomen. It was not typical of renal colic. It was increased by each act of micturition, which took place at regular intervals, three or four times in twenty-four hours. The attack subsided, and nine months later blood appeared in the urine, and then pus. The secretion had a sp. gr. 1010, and contained hyaline casts.

Dr. Groszlik diagnosed right-sided pyelitis.

On cystoscopy a rounded tumour with a smooth pinkish-red surface about the size of a walnut was seen to spring from the right ureteric area. The tumour showed marked transparency. The diagnosis of tumour of the bladder and pyelitis was made, and supra-pubic cystotomy was performed. The tumour was found to be a walnut-sized cyst, and on attempting to remove it, it tore open and a turbid fluid escaped. The finger was now introduced, and the cavity was recognised as a dilated ureter; two small stones the size of small beads were washed out. The patient recovered completely.

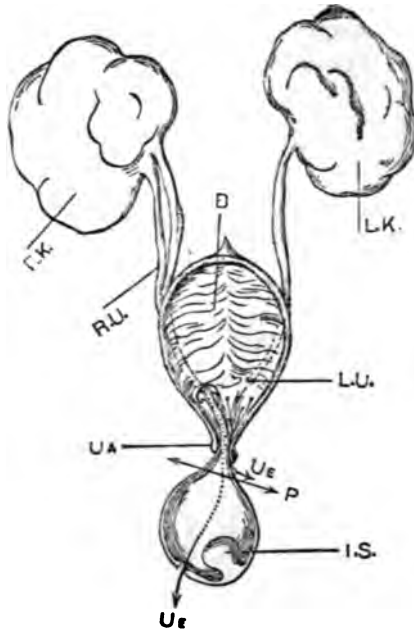
Caillé reports a case which he calls a "prolapse of the inverted lower portion of the right ureter," but his lucid description shows, I submit, that, in addition, a cystic distension or ballooning was also present, and that the case should be included not among the prolapses, but among the so-called cysts of the ureteric orifice.

A female baby aged two weeks who had had diarrhoea since birth was suddenly seized with a severe and prolonged fit of crying, and a soft bluish-red tumour, pyriform in shape, the size of a walnut, was then noticed to be protruding from the vulva. Palpation of the little mass gave the impression of a smoothly lined sac. A lateral opening in the right side was found, which admitted the passage of a probe. A small hard tumour the size of a pea within the cavity of the prolapsed sac was also noted, but its nature was not determined. It was assumed to be a prolapse of the whole or part of the bladder through the urethra, and after attempts at reduction its removal was determined on, and it was ligated and cut off. The baby died twelve hours later.

On *post-mortem* the removal of the stomach exposed to view a bluish, fluctuating mass about the size of a hen's egg representing the right kidney; also a mass similar in appearance, but smaller, representing the left. The right was in a state of suppurative

pyelo-nephritis. Both ureters were dilated. *The right ureter was double* (Fig. 114), with a double insertion into the hilus, both branches converging in their downward course and terminating by a single opening in the bladder. The bladder was found empty; the point of insertion of the amputated sac corresponded to the site

FIG. 114.



Caillé's case of cystic distension and prolapse of right ureter.

L.U. Opening of normal left ureter.

Ue. Opening of inverted prolapsed right ureter.

P. Line of resection.

of the opening of the right ureter. The prolapsed sac, which had been removed by operation, was continuous with the mucous lining of the right ureter, and was in fact a prolapse of the inverted lower third of the right ureter into the bladder and through the urethra (Fig. 114).

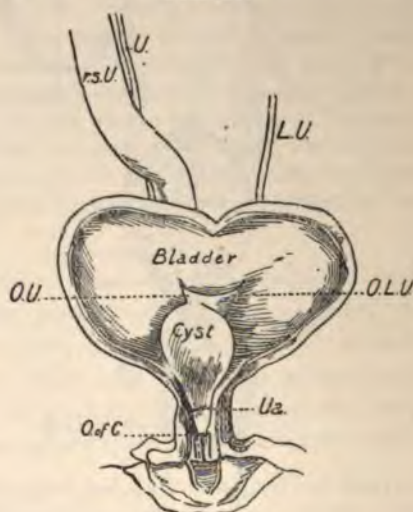
Dr. Caillé says, "It would appear that, owing to the formation of a warty or papillomatous small growth in the right ureter near its vesical insertion, a partial or complete occlusion of the ureter took place, in conse-

quence of which the small tumour was pressed into the bladder and finally through the urethra, carrying with it, or dragging along, the lower third of the ureter, which presented in the form of a sac."*

Pathological Anatomy.

From a very scanty literature of this obscure affection I select a few examples to illustrate its pathology more

FIG. 115.



Kolisko's case (modified).

r.s.U. Right supplementary ureter.

U. Right ureter.

O.U. Opening of right ureter.

L.U. Left ureter.

O.L.U. Orifice of left ureter.

Cyst at right side of trigone formed by the termination of the dilated supplementary ureter, r.s.U. The cyst opens at O. of C.

* 'International Journ. of Med. Sciences,' vol. xcv, p. 481, 1888. I always avoid criticising a case; but in this instance, without a microscopy of the small pea-sized tumour, I cannot accept the rendering that it was "papillomatous." In the cases I have seen a bluish-white, thickened fibrous nodule, or thickening, was present, which I submit is merely of an altered thickened ureteric orifice.



Blumer's case of ballooning of lower ureteric orifice.

exactly. Kolisko's* case refers to a woman aged twenty-one, who died of puerperal fever.

The right kidney had a double ureter and a separated pelvis. The upper pelvis, which corresponded to the upper, the smaller portion of the kidney, was much dilated, and the renal tissue atrophic. Its ureter, which was also dilated, pierced the bladder and terminated blindly below the position of the natural opening in a small nut-sized cyst (Fig. 115). The left kidney and ureter were normal.

Dr. George Blumer records a case, the particulars of which I quote from Kelly's invaluable work on operative gynaecology.†

A man who had suffered from acute cystitis for five years before death was examined post mortem. The bladder was enormously thickened (Pl. XVI), was corrugated and covered with diphtheritic patches. On the right side there was a hydro-ureter and a cushiony protrusion into the bladder as big as the end of the thumb (Pl. XVI, b). On the left side a pyramidal sac occupied the position of the ureteric orifice. The sac was fluctuating, eight centimetres long, three centimetres in diameter at the base, and nine centimetres in diameter near the extremity. High up on one side the minute ureteric orifice was found (Pl. XVI, a), as big as a pin-point, and situated in the centre of a small area of dense fibrous tissue. On opening the thin-walled sac the finger could be carried directly up into the dilated ureter.

The last case I should like to quote is that of Bostroem's, and I am indebted to Dr. Groszlik's lecture for it.

It is that of a girl who was about six months old. Directly after birth a marked distension of the abdomen was discovered, and four months before death a trilobular tumour in the abdominal cavity was made out. The two upper lobes lay in the lumbar region, one on each side of the vertebral column, and reached downwards as far as the middle line of the third lobe, where they united with it, and the latter reached as far as the umbilicus. The lower lobe was barely moveable, and remained in connection with the urinary bladder.

From the scanty report of the course of illness, it appears that

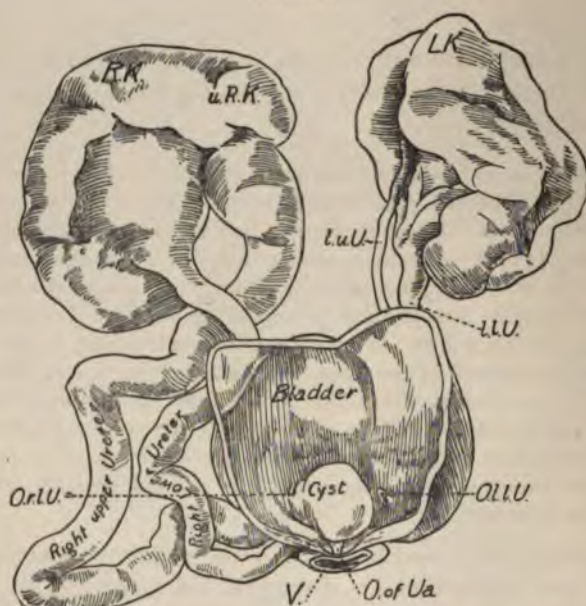
* 'Wiener klin. Wochenschr.,' 1889, No. 48.

† Kelly, 'Operative Gynaecology,' vol. i, p. 455.

the child at times remained dry for whole days, and only from time to time passed large quantities of apparently normal urine.

The post-mortem examination revealed numerous adhesions between the intestines and the three large tumours, of which the right one consisted of a hydronephrosis, of the size of two fists, and the left one of a hydronephrosis of half the size. The third tumour was the bladder enormously dilated, and filled with clear fluid.

FIG. 116.



Bostroem's case of cyst of ureteric orifice. [The arterial supply has been omitted.]

Cyst is at orifice of right upper ureter.

O.r.l.U. Orifice of right lower ureter.

O. of Ua. Orifice of urethra.

V. Vagina.

On each side were two pelves and two ureters. On the left side the upper ureter, corresponding to the smaller segment of the kidney, was less dilated than that of the lower larger segment. Correspondingly the upper pelvis was less dilated, and the kidney substance better preserved than below. Both ureters, which were closely adherent to one another, opened separately into the bladder (Fig. 116).

The right kidney also consisted of two segments, a larger lower one in the form of an extremely thin-walled cyst, and a smaller upper one, the secretory substance of which was nearly ten times as broad as the substance of all the other parts of the kidneys put together. Both ureters followed their course in a vermiform fashion, and were still more widely dilated than on the left side. The lower one opened at the normal situation in the trigone; the upper, more altered one pierced the bladder wall in a straighter direction, and ended blind as a walnut-sized cyst. The tension of the cyst varied, and depended on the degree of fullness; this could be modified by raising and depressing the kidney. In the condition of high tension this cyst appeared as a crescentic bladder, with very thin, smooth, transparent walls. It partly overlapped the opening of the neighbouring ureter, and as it extended to the left it compressed the openings of both the left ureters considerably, and caused a stasis of urine in them. The stasis was still further increased by the filled cyst completely overlapping the internal orifice of the urethra, whereby the retention during life was explained.

The bladder was much dilated and rugose. At the point of attachment of the cyst an opening in the wall was found. By means of this the cyst communicated directly with the dilated ureter. The tip of the little finger could be passed through the opening, which was surrounded by a ring of muscular fibres. The thin cyst wall was covered on both sides by mucous membrane.

A cursory glance at these and other cases in the literature reveals certain interesting and striking features, clinical as well as pathological.

In babies there is the history of fits, prolonged screaming, and diarrhoea with straining.

In the adult symptoms of cystitis, and if the ureteric protrusion was large enough to impinge upon the orifice of the bladder or to be caught by the sphincter, sudden stoppages in the stream, straining micturition, retentions, and even incontinence have resulted.

Pathologically, it will be noted how frequently a double ureter existed on the side on which the cystic termination was detected—nine cases out of fifteen in which the ending of the ureters is exactly specified.

It is noteworthy that the kidney from which a double ureter springs is often divided into two parts transversely.

An upper third, from whence the abnormally ending ureter emanates, this section of the kidney being atrophic from back pressure and diseased. A lower two thirds, from which the normal ureter arises about the middle, to end at the normal position in the trigone.

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CHAPTER XX.

THE VALUE OF URETERIC MEATOSCOPY IN THE LOCALISATION AND TREATMENT OF OBSCURE RENAL DISEASE.

HAVING learnt the A, B, C of ureteric meatoscopy, let us apply the knowledge by considering a few of the more obscure diseases of the kidney and ureter.

There was perhaps nothing so embarrassing to a conscientious clinician in pre-cystoscopic days as to be pressed to give a definite opinion upon the origin of blood or pus in the urine of a male patient who presented *no other symptoms* of disease. But the task is easy enough now, for the source of such blood or pus can be at once decided upon by the skilful use of the cystoscope. Again, before the introduction of that instrument, such cases, in their earlier stages, were beyond the domain of surgery. Surgical adventure was discountenanced because the difficulty of localising the disorder was insuperable. An insidious progress afforded the surgeon every inducement to temporise until the full development of the disease caused the diagnosis to become clear. But by then the chance was lost; a cure was unattainable. It is, therefore, to those diseases which produce blood or pus *painlessly* that one naturally turns to furnish the aptest illustrations of the value of the instrument.

Let us consider painless or symptomless hæmaturia first.

We know that blood may issue passively and painlessly from the bladder or kidney. Although it is difficult to group diseases with accuracy on the basis of single symptoms, yet my extended experience amply confirms the correctness of the table I published in 1893-5.*

* Author, 'Cardinal Symptoms of Urinary Diseases,' p. 21. 'Twentieth Century Medicine,' vol. i, p. 545.

Vesical	Onset sudden	{	1. Sessile or short-pedicated benign growth away from orifice of bladder.
	Course intermittent; rarely continuous		
	Painless at first*		
	Blood usually intimately mixed, but probably noticed pure at end of clear micturition at some time or other in course of case		2. Epitheliomatous tumour of posterior wall or sides (painless for months).
			3. Aseptic vesical stone over et. 55.

But there is no need to encumber this chapter with any further remarks concerning the vesical group, for I have dealt with this in detail in the foregoing chapters. It remains for the renal group to be considered, and in all cases it must be understood the hæmorrhage is *pronounced*, even profuse.

SYMPTOMLESS *v.* PAINLESS RENAL HÆMATURIA.

From the early days of the last century it was known that the kidney might bleed passively and painlessly, and professional opinion was much exercised about the causation. The literature on the subject is copious. Rayer† devotes a whole chapter to it, but it remained obscure until the cystoscope was introduced. Even now, although it is freely admitted that this form of bleeding is most often unilateral, and surgeons operate and examine the kidney carefully, its pathology and cause are still unsettled, and its nomenclature is ponderous, far-fetched, and ambiguous.

Thus, such cases are described by Senator, Pasnet, and Broca as renal hæmophilia; by Pigné and Reblaud and by Groschlik as hæmorrhage of anatomically unchanged kidneys; by Leguen as hæmaturic neuralgia; by Klemperer as hæmaturia from a healthy kidney; and by Rovsing‡ as mysterious hæmorrhage. These authors

* The pain due to the passage of vesical clots is not, of course, taken into account, being merely temporary and of mechanical origin.

† Rayer, 'Traité des maladies des Reins,' 1841, Paris, t. iii, pp. 357—434.

‡ Thorkild Rovsing, "Mysterious Hæmorrhage from a Single Kidney," 'Brit. Med. Journ.,' 1898, pt. ii, p. 1547.

cannot explain the bleeding except by the supposition that a "local hæmophilia" or an "angioneurosis" existed in the organ. I cannot accept such terms either as applicable or as warrantable, for, as Rovsing has pointed out, a distinct pathological change is mentioned in most of the cases as being present. Thus in the case observed by Senator and Israel, histological examination of the removed kidney showed interstitial inflammatory areas; in Sabatier's case there was chronic albuminuria, bacteriuria, and the microscopy of the removed kidney showed traces of interstitial inflammation and sclerosis. In Broca's case epithelial and granular cylinders and cells of renal inflammation were present. Moreover, in Israel, Pigné, and Reblaud's cases the kidney was both displaced downwards and movable.

To me the subject has gradually assumed a simpler and a clearer aspect since I collated those cases of painless renal hæmaturia which I have examined cystoscopically during the last ten years. I do not, of course, ask for a general acceptance of the views I formulate, I give them merely for criticism and correction.

My painless renal hæmaturial cases fall primarily into five great groups. Each group, however, may, as its clinical history develops, be associated with renal pain, and to these latter I propose to devote a little attention later on, but their initial stages may be characterised by no other symptom beyond the appearance of blood in the urine.

1. Chronic granular nephritis (cirrhotic kidney).
2. Angioma or capillary nævus of a renal papilla.
3. Benign and malignant growths of the kidney (pelvis or ureter).
4. Rare cases of embedded aseptic calculus.
5. Submucous deposit of crude tubercle.

1. *The Painless Hæmaturia of True Granular Nephritis (Cirrhotic Kidney).*

History.—Since the middle of last century it has been

understood that hæmorrhage occurs in the course of chronic nephritis, but it was not, I believe, impressed upon the profession that the hæmaturia might occasionally be *quite severe*, until Sir George Johnson* wrote as follows:

"During the progress of the various forms of chronic Bright's disease the walls of the Malpighian capillaries become thickened, and therefore probably less liable to be ruptured. In many cases, too, the muscular walls of the minute arteries are more or less hypertrophied, and the effect of this is to lessen the pressure upon the Malpighian capillaries and the risk of their rupture. This appears to be the explanation of the undoubted fact, that the pale urine of low specific gravity which is secreted by kidneys in an advanced stage of degeneration is rarely tinged with blood.

"This rule is, however, not without exceptions. In the advanced stage of all forms of chronic Bright's disease the blood becomes much deteriorated, and the minute arteries and capillaries may undergo degenerative changes which increase their liability to rupture.

"There is consequently a tendency to hæmorrhage from various mucous surfaces, *e. g.* bladder and pelvis of kidneys. You will probably find there are no blood-casts of the tubes as there usually are when the substance of the kidney is the source of the bleeding. You may find some of those forms of tube casts which point to the existence of chronic rather than acute disease, *e. g.* oil casts, large granular and large hyaline casts."

Dr. Samuel West apparently recalled attention to this fact,† but considered the hæmorrhage to emanate from the bladder because of the *brightness* of the flow.

Unaware of this paper, I published in a series of lectures‡ cases to prove that *bright* hæmaturia occurred in the course of chronic nephritis, that the hæmorrhage

* Sir George Johnson, 'Medical Lectures and Essays,' p. 747.

† Dr. Samuel West, 'Lancet,' 1885, vol. ii, p. 104.

‡ Author, 'Cardinal Symptoms,' 1893, p. 22.

most often issued from the kidney, and nearly always from *one* kidney. Further experience has convinced me that the hæmorrhage is usually from the mucous membrane of the renal pelvis, that the loss may be moderate and persistent, and occasionally alarmingly profuse. Also that when there is a great admixture of blood, the evidence of chronic nephritis in the shape of casts and other products of degeneration is not usually discovered.

Clinical.—The hæmaturia which appears during the course of the life history of chronic granular nephritis is, in my small experience, an early symptom. It has appeared in nearly all my cases before the advent of noticeable cardio-vascular or retinal changes. There are nearly always tube casts, I believe, to be found in the urine, even at the first attack of hæmaturia, also a faint trace or more of albumen, irrespective of the blood which may be present. The specific gravity ranges from 1010 to 1020. In most instances the bleeding has been transitory and moderate in character, darkish in colour, and under control of drugs, and the patient has not been sensibly affected by the loss. It may recur at intervals of months or years.

It occasionally happens, especially in anæmic girls, that the hæmaturia assumes a brighter aspect, and the more anæmic the patient, the more raspberry-red is the colour. It may then become constant, varying, it is true, in severity and in colour, but always present, and the loss may proceed for months despite all efforts to control it. Absolute rest, hæmostatics, astringents, opiates, all prove unavailing. As the anæmia deepens the patient becomes lethargic, breathless, and fat. Even now it may suddenly cease and not return, or return after months when other symptoms have supervened which give the clue to its causation, such as high tension, thickened arteries, accentuated cardiac impulse.

I have examined many such cases, and have had some under my observation for years—three, seven, ten years,—in fact, ever since the introduction of the cystoscope in

1889, and one or two remain apparently well and do not appear to be much incommoded by the occasional outburst.*

In rare instances the bleeding may be alarmingly profuse. I have met with patients, usually youngish men, in whom the hæmorrhage was so profuse that the bladder became filled with clotted blood, and all the pains of reno-vesical colic due to clot were superadded to the depressing effects of the hæmorrhage. Such cases are very perplexing, for the character of the vesical colic or subsequent cystitis import an obscurity into the history which seriously vitiates the accuracy of the diagnosis. One case came under my friend Dr. Tratman, of Perth, West Australia, and he found himself forced to do suprapubic cystotomy for the removal of the massy clots. The pain due to retention was at once relieved, and the hæmorrhage quietly subsided. In this case the symptoms were very sudden. When I saw the patient some months later the cystoscope proved the bladder to be perfectly healed and healthy in every part, but changes around the left ureteric orifice suggested to me that the bleeding had

* West mentions one case he had watched for eleven years, and though there is no notice about tube casts in the report, the urine was 1010, and albumen was usually present in varying proportions.

"Recurrent Hæmaturia under observation eleven years.—The patient was a man æt. 23. Hæmaturia was first observed in 1881 for ten days. Two attacks (ten days and seven days) followed in 1883; one in 1884; two in 1885; one in 1886; one in 1888. These attacks occurred under my observation. The blood was on all occasions bright in colour, and enough to colour the urine well. The urine was of 1010 sp. gr., and contained albumen (about one twelfth), but varied much on different occasions. The arteries were thick. There were no retinal changes observed. Frontal headache was the chief symptom.

"The patient was last seen in January, 1894, being then æt. 30. No new symptoms had developed and no retinal changes were present; no distinct cardiac hypertrophy could be made out, but the arteries were thick and tension high. The specimen of urine then brought contained no albumen.

"I formed the opinion in 1883 that the man probably had granular kidneys, and I saw no reason subsequently to change my opinion. I do not know the result of the case, which has not been seen since 1894."

been unilateral and left-sided. His urine was examined for me on several occasions by Dr. Leslie Eastes, and it always contained tube casts. Circumstances prevented me decapsulating the kidneys, and I lost sight of the case. Still further, the hæmorrhage may be as alarmingly profuse in patients suffering from chronic granular kidney complicated by urinary obstruction. Mr. Anthony Bowlby* drew attention to this subject in 1887. As there are usually other symptoms present, I allude to the subject under the heading of Hematuria with pain, on page 428.

Cystoscopy.

Ureteric Meatoscopy.—The cystoscope has demonstrated that the bleeding is from the kidney, and from one kidney usually. There is generally no visual change in the ureteric orifices, and unless there is an efflux of dark bloody urine from one of them the examination is valueless, beyond establishing visually that the bladder is free from disease and that it is not the source of the hæmorrhage. In rare instances I have seen the orifice puffy and the emergent and entering vessels more than usually visible. (*Vide* case of A. H—, p. 386.)

Ureteric Efflux.—When the kidney and ureter are functionating, a more or less forcible stream of darkish urine will be seen to issue and mix with the surrounding medium. I have seen (Ryan's case) an oblique rush of dark bloody urine issue from an orifice, and when the efflux had died down and before another appeared I have noticed a little fresh blood ooze out, showing that the bleeding was from the mucous membrane and not from the parenchyma. This case was cured by free incision into the renal cortex. Sometimes the efflux is temporarily absent, the function of the kidney being inhibited by emotional impulses (cf. Case 1, p. 395).

Generally, however, it will be noticed that the jet is

* "Cases of Profuse Hæmaturia in connection with Granular Kidney,"
'Clinical Trans.,' vol. xx, 1887, p. 147.

forcible, and the amount of the jet *large*. Often as not the opposite kidney and ureter will be working sluggishly, and the efflux on that side will be a feeble, glycerine-like stream. These signs are evidences that the bleeding kidney is working energetically, that the blood is but a small admixture, and that probably both hyper-secretion of urine and bleeding are due to local hyperæmia. Under these circumstances the other kidney works feebly, being probably reflexly inhibited, and it is remarkable that it may continue in this habit, even when the whole stress of the body work is thrown on it after nephrectomy of the bleeding kidney.

I have not yet encountered a case where both kidneys were bleeding simultaneously.

There is no need to quote many cases. I have had many. I once estimated they formed 12 per cent. of my painless hæmaturias. One or two recently noticed will be sufficient.

Case.—A. H—, æt. 27, consulted me in November, 1901, with well-marked renal hæmaturia.

A year ago he noticed his urine like strong beef tea. There were no symptoms; it subsided gradually. Four months ago the urine became bright red with blood. There was no pain, and the loss continued. He suffered, however, from "awful thirst," passed a quantity of urine, rising on an average five times at night, and lost two pounds' weight in a month.

When I saw him there were no marked cardio-vascular symptoms. There was no pain. The urine was copious, of the colour of strong beef tea, sp. gr. 1010, containing albumen, depositing red blood-discs in various stages of disintegration, including a brown granular deposit, the result of the completion of the process. There were numerous tube casts—blood, coarsely granular epithelial; several tubal cells were free in the deposit. There was no pus and no tubercle bacilli.

Cystoscopy.—I drew off twenty-four ounces of dark bloody urine of a renal type. The bladder was healthy, finely fasciculated. The right ureteric orifice was certainly swollen, and the vessels, emergent and entering, were very apparent in the form of a sheaf of four or five trunks passing along the interureteric fold. No efflux seen. The hæmorrhage ceased. The patient is still under observation.

I do not wish it to be inferred that the bleeding is invariably from the kidney in chronic Bright's disease. It may issue from the vesical neck, or the posterior wall of the bladder in very exceptional cases. It is then dependent, perhaps, on general vascular changes induced by the chronic nephritis, and seems to be similar to those other hæmorrhages from mucous membranes which are noticed in that disease. Usually it is much more arterial in aspect when it originates in the bladder.

Dr. Sears, of Blackheath, sent me a gentleman, æt. 60, with the following letter :

"The patient suddenly passed, on September 22nd, 1901, a quantity of pure blood from the urethra. The loss was repeated, being apparently causeless and painless. The blood ceased, and the urine was found to be acid, 1010, and to contain albumen. The deposit was considerable, and consisted mainly of red blood-discs in various stages of disintegration. A very few short casts filled with the granular débris of red discs were seen, and there was much renal pelvic epithelium, derived from the superficial and deep layers of the pelvic mucosa. There was no pus. A very few crystals of indefinite crystalline shape were present (L. Eastes)."

Dr. Sears considered his patient to have some chronic granular nephritic change, and his view was confirmed by the fact that the patient got up frequently at night and passed a large quantity of water.

I examined with the cystoscope September 27th. The bladder was white and healthy, a little fasciculated. Both ureteric orifices were healthy, but the uvula vesicæ was deeply congested; its surface was eroded, and looked as if it had been the site of recent hæmorrhage.

The prostate was small and fibrous. The patient did not improve; the hæmorrhages recurred, and became very profuse.

Fallacy in Microscopical Diagnosis.—It is perhaps necessary in these days of expert report upon urine treated by accurate centrifugalising to state that the casts must be in abundance.* If we are to diagnose chronic nephritis

* The presence of renal tube casts indicates a morbid lesion of the

upon this single symptom, it must not be because a few casts are present in the urine of a patient passing blood painlessly. A few casts are not diagnostic of chronic nephritis, nor are they any index of the extent to which the kidney or both kidneys have become affected by that disease. I know of *no* disease of the kidney in which casts may not be found in the centrifuge deposit. Thus ureteric bends, stone in the renal pelvis or ureter, carcinoma, slight pyelitis, may all supply a urine containing a few casts, for all these diseases more or less affect, either by pressure or inflammation, an increasing area of the renal parenchyma.

Occasionally a chronic nephritis may become affected by or be present with carcinoma of the kidney, and thus obscure the graver symptoms. A case was sent to me by Dr. Holroyd, of Chatham, with moderate hæmaturia, the urine being loaded with casts; the diagnosis of chronic nephritis seemed apt, and treatment for that disease was carried out. But in a year a large hard tumour appeared and filled the right renal region, and the urine became scarlet with blood—obviously a right renal carcinoma had developed, probably upon a kidney previously affected by nephritis. This diagnosis was confirmed by autopsy.

Prognosis.—Transient attacks of moderate dark hæmaturia occurring in conjunction with urinary casts or albumen (above that caused by the blood) need not be regarded with alarm, provided that the patient does not exhibit any advanced cardio-vascular changes and no retinal splashes are present.

kidney, but they convey no appreciation of how much the kidney is affected.

Mem.—Pure blood-casts indicate congestive hyperæmia; they are best seen in severe burns.

Blood-casts composed of blood-cells, epithelium, and leucocytes indicate acute nephritis; granular casts and fatty casts show chronic nephritis; epithelial casts and blood-casts, with much albumen in urine, show acute nephritis; pus casts and bacterial casts show septic influence of the renal parenchyma; amyloid casts show amyloid infiltrates.—NEWMAN, *op. cit.*

In fact, there is some reason to believe that such bleedings are generally from the pelvis of the kidney, and act like other moderate bleedings from mucous membranes, as a relief to the state of vascular tension. Moreover these renal hæmorrhages often occur early in the course of the disease, and clinical knowledge, as well as surgical intervention, points to the fact that small areas only of one or both kidneys are affected in the earlier stages, the disease spreading gradually. It affords thus a chance of appropriate treatment being early adopted for the disease itself, a fact which should make the prognosis more hopeful.

West* is very explicit on the greater hopefulness of the prognosis of chronic granular kidney. He says: "Granular kidney doubtless shortens life, but possibly not as much as at first sight appears. The disease is rarely diagnosed until it has reached its later stages and symptoms are pronounced; at that time it is true that the prognosis is bad, and that the patient, as a rule, has not long to live. As it is not until the late stages that marked symptoms arise, and as the pathological process is a long-standing gradual degeneration, it is evident that the real duration of the disease is much longer, and to be measured by years. Though it is true that the majority of fatal cases occur in the middle or later period of life, say between forty and fifty years of age, still there are good grounds for believing that the beginnings of the disease, even in these cases, are to be found in adolescence or early adult life, and that they may be recognised then with certainty in some cases and with much probability in many more. If, then, the disease, unrecognised and untreated as it usually is, permits of life to an average age of forty or fifty years, there is fair reason to presume that an early diagnosis and appropriate treatment would tend to lengthen its duration and thus improve the general prognosis."

Treatment.—I do not propose to touch upon the medi-

* West, 'Granular Kidney,' p. 146.

cal treatment of granular nephritis, but merely upon that which might serve to control the hæmorrhage. If there is no evidence of a recent acute attack of nephritis a mixture containing iron alum (gr. v) will often be found efficacious. In other instances opium in its various forms will often prove of value. The fluid extract of *triticum repens* appears to be the best of the infusions for passive renal hæmorrhage.

Operative.—One has been rarely called upon to operate for passive renal hæmaturia due to chronic granular nephritis, but occasionally the bleeding has been so obstinate and the patient's friends have become so alarmed at the increasing anæmia that surgical intervention has been demanded. Under these circumstances I have first cystoscoped and then cut upon the kidney whence the blood was seen to be issuing. I have invariably cut through the cortex of the lower half, believing that the hæmorrhage always issues from the lower calyces (*vide* p. 394), and that fixation of the kidney is an important element in preventing a return of the hæmorrhage. This has sufficed to arrest the hæmorrhage.

The surgeon should not, I think, advise operation if retinal changes are present, for the duration of life after albuminuric retinitis has become apparent is short.* Nor would he be wise to do so if the cardio-vascular changes are well marked. No aseptic surgeon will, I take it, decline to operate merely because granular nephritis is

* Miley traced forty-five cases, and found the average duration of life to be under four months from the time when the eye changes were first observed; and though one of the patients lived eighteen months and two fourteen months, all the rest died within the year. In nine cases in which the first appearance of eye changes was noticed the duration averaged less than six months, and in two cases it took a month for white patches to develop after the appearance of hæmorrhages.

Bull, in 100 cases of albuminuric retinitis, found that 86 of 103 died, 57 in the first year, 12 during the second, and 17 after a longer period. Of the 17 remaining cases that were still living at the time his paper was published, 14 had been seen only during the six months immediately before the paper was written, but one had been diagnosed seven years previously (quoted from West).

present. So long as rigid asepticism and extreme gentleness of manipulation * are adhered to the patient will be benefited rather than the reverse.

Since the introduction by Edebohls of decapsulation of the kidney for the cure of chronic nephritis I have followed this method, but cannot speak positively yet as to its value in checking the hæmorrhage and curing the patient. His report has prompted me to advise operative interference earlier, and even in those cases where the hæmorrhage has not been severe.

Edebohls relates the following case,† which is extremely valuable as an indication of the value of surgical aid in hæmorrhages due to nephritis :

"Acute Hæmorrhagic Nephritis ; Decapsulation of both Kidneys at One Sitting.—Married woman of 68. Severe attack of influenza in January, 1900, followed by albuminuria and cylindruria, with severe and persistent hæmaturia. Seen March 7th, 1900. Patient uræmic ; urine black with blood. Right kidney three to four times its normal size, displaced, movable four inches, sensitive on pressure. Left kidney enlarged to twice its normal size, displaced, not sensitive. Examination of urine by Professor Brooks showed casts of all varieties in abundance, and a great deal of blood. Diagnosis of Professor Brooks : 'Renal hæmorrhage ; tumour or stone.' Clinical diagnosis : tumour of right kidney.

"Operation, March 8th, 1900, under nitrous oxide and oxygen anæsthesia. Bilateral lumbar incision. Right kidney three times its normal size, purplish black from congestion, hardened, and infiltrated with numerous extravasations of blood everywhere. No evidence of stone or tumour on careful palpation of the delivered

* It is as well to remember that though aseptic surgery does not hesitate to interfere when albuminuria and casts are present, yet an attack upon an inflamed kidney demands *rigid* asepticity and the greatest gentleness of manipulation. Any inflamed kidney, and especially one which is acutely hyperæmic, is a most excellent culture material for pathogenic organisms ; it is readily infected and as readily dies a functional death. It is, moreover, the most friable of all tissues ; it tears easily and widely, bleeds alarmingly, and the hæmorrhage is sometimes so far beyond control that nephrectomy has to be performed. This statement is especially true for chronic parenchymatous nephritis.

† Edebohls, "Renal Decapsulation," 'Brit. Med. Journal,' p. 1510, Nov. 8th, 1902.

kidney. Left kidney twice the normal size, otherwise in same condition as right kidney, with the addition of the presence of three cysts, the largest being about 3 cm. in diameter. Nephritis acutissima of both organs. The largest cyst was cut away, and the two smaller were punctured. Decapsulation of both kidneys and anchorage by means of the detached capsule proper were next performed. The renal hæmorrhage ceased immediately and definitely after operation. Casts and albumen in the urine, with uræmia and occasional uræmic coma, persisted during the first two weeks after operation, and then finally disappeared. At the end of three weeks patient was considered well and left her bed. On March 29th (apparently the day of her getting up) she contracted pneumonia, the result of exposure to cold draughts. Œdema of the lungs supervened, to which she succumbed on April 4th, 1900 (*four weeks after the operation*).*

"Examination after death showed the left kidney restored to its normal size; right kidney only slightly enlarged; both kidneys healthy in appearance. Section through both kidneys failed to disclose any evidence of pus, stone, or tumour. Microscopical examination by Professor Brooks showed practically normal kidneys."

The reader will note that these results are obtained in four weeks; I do not comment upon the rarity of the case, the uncertainty of the exact cause of the nephritis, or rapidity of the change in the kidneys.

2. *The Painless Hæmaturia of Angioma or Capillary Nævus of a Renal Papilla.*

But occasionally the practitioner is confronted by a case of renal hæmorrhage in which no evidence of chronic nephritis is to hand, and no growth, tubercle bacilli, or crystals can be found in the urine. The diagnosis of such a case is, in my opinion, the most difficult of any in the whole range of urinary disease.

In some cases the papillary plexus of vessels which surround the papilla of one pyramid may become so dilated and numerous (angiomatous) that bleeding may occur and persist for years.

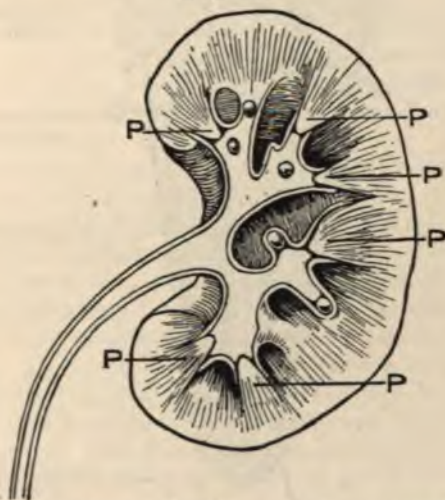
* The italics are mine.

I cannot attempt, of course, to formulate rules for diagnosis of this condition. I can only record briefly my own experience of it.

Before touching upon this important subject, which, I believe, may prove an important clue to the correct elucidation of many of the obscure hæmorrhages from the kidney, I propose to glance at the anatomy of a pyramid.

On splitting open a kidney by a longitudinal section one notices that the solid part consists of a number (twelve to eighteen) of separate conical masses called pyramids of Malpighi (Fig. 117, P), which are embedded

FIG. 117.



Longitudinal section of the kidney to show pyramids (P) and papillæ projecting at various angles into the calices. (After Quain.)

entirely in cortical substance except at their apices (the papillæ); the broad bases of the pyramids are directed towards the surface of the organ, and the apices form the prominent papillæ which point towards and project into the sinus (the pelvis of the kidney).

The arterial branches penetrate the substance of the organ between the papillæ, and enter the cortical substance which intervenes between the pyramids of Malpighi; when they reach the base of the pyramid they form arches—arterial arches (Fig. 118). From these vascular arches straight vessels accompany the numerous

FIG. 118.

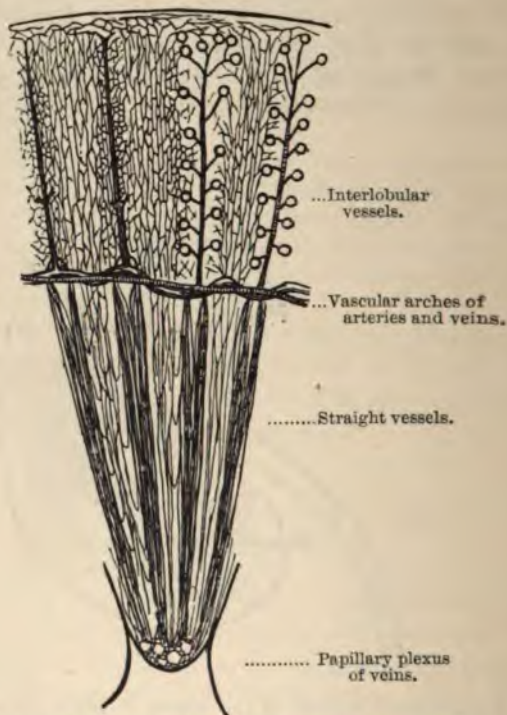


Diagram of a section through a pyramid and the superimposed cortex. (After Testut.)

tubes to the papilla. The veins of the pyramid commence in a close plexus of small venous radicles surrounding the excretory ducts at the papilla. They, passing outwards towards the base of the pyramid, collect in bundles and open into the concave side of the venous arch (Fig. 118).

Now in the cases I have encountered in which the angiomatous condition of the papilla was present, the persistent hæmaturia has been cured in two ways: either by cutting the varicosed papilla out bodily with a sharp spoon (papillectomy), or by cutting through the cortex and destroying the vascular arches of the base of the pyramid. In either case the bleeding stops at once—but it is very difficult to find out which papilla is angiomatous, for it may lie so deep in a calix as to be practically unapproachable from the pelvic cavity, as occurred in Case 6 (p. 400), in which case nephrectomy may be necessary. The subjects may be made clearer, I think, by giving cases.

Case 1. Intermittent hæmaturia for five years, occasionally persistent, latterly profuse; marked anæmia; cystoscopy; renal exploration; renal pelviscopy; papillectomy; cure.—Miss L—, æt. 18, was sent to me in March, 1898, by Dr. Albert Davis, of Liverpool, to ascertain the site and cause of an intermittent hæmaturia of five years' standing. Dr. Davis wrote:

"The attacks come on suddenly when she is in good health, last several weeks or months, and cease as suddenly. She has been under the care of several, and has been in the Liverpool Royal Infirmary under Sir William Banks, who diagnosed the case as one of hysterical hæmaturia, because of the attacks ceasing as soon as she entered the hospital. Astringents have no effect. Bacteriologically and microscopically there is no evidence of the nature of the disease. I send her to you to examine the bladder with the light, and if that is normal to catheterise the ureters."

When the girl came under my care she was lethargic and profoundly anæmic. The urine was maroon-coloured; no casts, tubercle, or renal pelvic cells could be found by the Clinical Research Association.

I examined cystoscopically, and although on each occasion my catheter drew off dark bloody urine, I could see no ureteric efflux. I tried once or twice, but always failed, though bloody urine was passed soon after I left.

As she had a suspicion of rigidity and tenderness in the right loin, I sent her home with the diagnosis that both ureters were healthy, but that I believed the cause was stone in the right kidney, and in view of the extreme pallor and uncontrolled hæmorrhage right renal exploration, possibly nephrectomy, would have to be carried out.

But I was not satisfied; I remembered that on several occasions I had examined other cases for undoubted painless renal hæmorrhage and had found the ureters "off work." Could Sir William Banks be correct, and this dark renal hæmorrhage be really of nervous origin? The patient was brought back in a few weeks; her hæmaturia and pallor were more pronounced. One morning I appeared on the scene quite unexpectedly and examined her in bed. The left ureter was rapidly pumping jets of dark bloody urine; the right ureter was working slowly and sluggishly, but the urine from it was clear. Evidently by taking the girl unawares I had gained my object. The bleeding and renal secretion were under nervous control.

Instead, therefore, of cutting on to the right kidney as I had proposed, because of its tenderness, I brought the left kidney out on to the loin. It was healthy both to sight and touch. I therefore turned it over and examined its pelvis and ureter. Both were healthy. Hoping to find a simple solitary ulcer of the mucous membrane of the renal pelvis analogous to that condition which I had described in the bladder,* I incised the pelvis, separated the edges, and threw the electric light inside. After swabbing away a little blood I saw, to my astonishment, what I believed to be a villous tumour of a papilla. A tuft or congeries of vessels surrounded the extreme apex of a papilla about the middle of the sinus, just within the margin of the hilum (Plate XVII). My assistant and Mr. Woodhouse Braine, who was anæsthetising the patient, both examined the papilla. Every other papilla was pale and healthy. I now took a Volkmann's spoon and cut the papilla and fully half the Malpighian pyramid out. The wound leaked urine for a couple of weeks, and then firmly and finally closed. No blood was seen after the first dressing of the operation wound, and the urine at once became brilliantly clear. The tenderness in the right loin disappeared. She has remained well ever since, becoming stout and active.†

On examining this papilla under water I saw that it was not villous, as I had supposed, but that the vessels of the mucous membrane clothing the papilla were markedly varicosed.

Mr. Targett kindly examined the specimen for me, and reported there was no evidence of growth, but there was a congestion of the vessels with extravasation of blood and an increase in the cellular

* Author, "Solitary Ulcer of the Bladder," *'Brit. Med. Journal,'* May 9th, 1896.

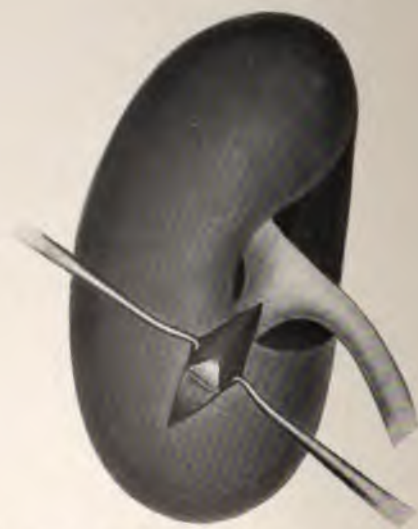
† Patient had a very slight relapse a few weeks ago, that is eighteen months after the operation, but is again well (December, 1902).



Angioma of a renal papilla which had bled for five years :
papillectomy : cure.
(Author's case.)







Angioma of a lower renal papilla: papillectomy: cure.
(Author's case.)

stroma. This might be—suggests Mr. Targett—an early stage of a fibromatous condition, such as is not uncommon in the tips of the papillæ.

Case 2. Alarming hæmaturia; profound anæmia; cystoscopy; renal pelviscopy; papillectomy.—I was asked in September, 1899, by Dr. Wigg to examine a lady, æt. 30, suffering from profuse hæmaturia.

The hæmorrhage had appeared fourteen days previously without any apparent cause and without any symptom to mark the origin of the blood. No renal cells, growth fragments, tubercle, casts, nor crystals could be discovered (Clinical Research Association). Cystoscopy showed streams of bloody urine to be issuing from the left ureter; the bladder was healthy. Astringents were powerless, and the hæmorrhage became so violent and the patient so exhausted that I operated a week later, bringing the left kidney out on to the loin. It was absolutely healthy, likewise its pelvis and ureter. I opened the common pelvis and washed away the collected blood. The mucous membrane was healthy, but as fast as I washed away the dark blood more issued from the lower branch of the pelvis. I therefore slit it up through the kidney substance, separated the incision by means of retractors, swabbed out, and threw in the electric light (Plate XVIII). I now saw a bright red varicosed papilla, precisely similar in appearance to that which I encountered in my first case. Eight or ten medical men examined the papilla, and I was able to assert that this small point was the source of the hæmorrhage, and that by cutting it out the hæmorrhage would be arrested. The statement was received with much reserve, for it was hardly credible that so dangerous a hæmorrhage could originate from so small an area. I scooped out the papilla, and I am glad to say my prognosis was verified. No blood has appeared since, and the loin healed for a time. Mr. Targett reports that "the vessels in this part of the kidney are distended with blood, and there is some extravasation."

Progress of case.—The loin became inflamed some months afterwards. It broke open, and the sinus became septic, but no more hæmorrhage occurred. I am inclined to blame a couple of chronic acid stitches which I inserted into the kidney tissue at the time of the operation, because a colleague used a strand of the same material to close a renal incision, and it was subsequently passed *per urethram* after much suffering.

In these two cases the papillæ which were affected were got at easily. They were not deeply placed, but

just at the opening of the lower infundibulum. I was encouraged to continue opening the pelvis in similar cases, but I regret to say I did not appreciate the extraordinary obstinacy of the bleeding from a spongy, varicose papilla, and my next case taught me that if it is operated upon at all, it has to be *thoroughly* removed.

Case 3. Profuse hæmaturia recurrent upon the slightest exertion, persistent and profound anæmia; cystoscopy; renal peltotomy; swabbing a papilla with strong iron solution proved useless; nephrectomy; cure.—J. P., æt. 36, was sent to me by Dr. Stewart, of Waterford. The patient had been admitted twice into Waterford Infirmary with profuse hæmaturia, and each time after a prolonged rest he had left the hospital with clear urine. The bleeding recurred, however, on each occasion in a week or two. He had had slight pain over the right kidney, which disappeared when the hæmorrhage ceased, and returned with its recurrence. When I saw him he was pallid and wasted. The hæmorrhage recurred on the slightest exertion. I suspected renal carcinoma, but could detect no tumour. Urine sp. gr. 1022—1030; no tubercle bacillus, pus, or blood; no casts. Large sharp efflux of dark urine from right ureteric orifice; bladder healthy.

Diagnosis.—Right renal hæmaturia; cause doubtful.

Operation (July 9th, 1902).—Exploration of kidney by the lumbar route. The right kidney was easily reached; it was fairly movable, and it had few adhesions; the cortex appeared normal. Its sinus, however, was distinctly hollowed (canoe kidney, foot-note, p. 344), and there was a separate blood-supply to the tail. The ureter was healthy. The pelvis was opened; blood kept issuing steadily from the lower infundibulum. Instead of performing papillectomy I applied iron solution to the bleeding patch, and hoped that would suffice. No benefit accrued. The bleeding continued unabated. He was therefore prepared for nephrectomy two months later (September 9th, 1902).

Cystoscopy.—The lips of the right ureteric orifice were a little puffy and stained red, the opening itself being patulous. A thin tricklet of blood issued from it when pressure was exerted on the right kidney and along the right ureter, but there was no jet. The left ureteric orifice was smaller, but it also was a little puffy and open.

Inference.—Hæmorrhage proceeds from the pelvis of the right kidney, which is either temporarily or permanently inactive. There is a slight inflammatory wave descending from the right kidney pelvis and affecting the trigone.

Operation.—The right kidney was found to have retracted under the ribs, as all inflamed kidneys do when no large collection of pus is present to force them down. I found the renal tissue very friable, and the bleeding became severe on manipulation. I removed it after clamping the pedicle. The patient healed, and reported himself well six months later.

The kidney was found to be in a state of subacute nephritis, probably induced by the operation. There was no pelvic growth, no stone, no ulceration, but the case is vitiated to some extent by the first operation, for it is uncertain how far the intervention produced the inflammatory condition found on the second operation; it is included, however, in the class containing angiomatous papillæ, because at the first operation, when the renal pelvis was inspected, a flow of blood issued from a lower calix. This case made me dissatisfied with opening the pelvis, and I determined to attack the vascular arches in the lower third of the kidney, for in the three previous cases the bleeding had originated from one of the lower papillæ.

Case 4. Pronounced hæmaturia for eight weeks; cystoscopy; section through vascular arches of lower third of kidney; cure.—I was asked by Dr. A. F. Penny to see a patient who had been passing blood in his urine for eight weeks without any intermission. There was no apparent cause for the onset, but after it had started any movement caused an immediate and a severe increase in the severity. It was quite symptomless. The urine contained blood-cells only, no casts, nor tubercle bacilli, nor crystals. Sp. gr. 1020.

Cystoscopy.—The bladder was healthy. An oblique rush of dark bloody urine was seen to issue from the left ureteric orifice; occasionally the efflux consisted only of a little brighter blood, which came out slowly and finished in a trickle; but generally the efflux was powerful, full, and dark.

Inference.—A healthy left kidney with a small area of hæmorrhagic disease, hyperactive because of irritation of the blood, and bleeding freely because of a congestion of the gland. The site of the bleeding point is pelvic because of the escape of tricklets of blood between the normally timed effluxes.

Operation.—I turned the left kidney on to the loin. If any kidney, or pelvis, or ureter appeared healthy, this did. I cut deeply into the cortex of the lower third, but *without entering the pelvis*, and roughly used the point of the finger to enlarge the bottom of the wound, hoping by this means to destroy the vascular arches of one or more of the lower pyramids. There was free bleeding, but this

was checked at once by cortical sutures. The hæmaturia disappeared in a few days, and he healed quickly.

Six months later patient reported himself as well.

Case 5. Sudden brightish hæmaturia coming on in the night; intermittent, but returns on the slightest exertion; left renal incision; cure.—G. Y—, æt. 38, was sent to me by Dr. Stanley Carpenter, April 29th, 1898. Ten days prior to seeing me an attack of symptomless hæmaturia, the secretion having the appearance of dark, muddy ale. Standing on the table, when he came to see me, was a sample left by the previous patient. Both samples had exactly the same visual appearance. One (G. Y—'s), however, was of renal origin; the previous patient had villous papilloma (subsequently removed by me).

G. Y— complained of no lumbar pain—no renal tenderness. There was no tumour to be felt. Urine 1025, acid; blood; no casts. After a long and fruitless trial with drugs, the bleeding being aggravated in severity by movement, I decided to interfere.

Cystoscopy.—Bladder normal. A rapid, dark, bloody efflux from the left ureteric orifice.

Inference.—A healthy kidney with a small hæmorrhagic area in pelvis.

Operation.—The left pelvis was felt as usual with the blunt end of the forefinger through a deep incision in the cortex of the lower third of the organ, but the pelvis was not opened; nothing was found.

The patient recovered quickly, though he had continuous hiccough for a week after the operation. The hæmaturia ceased at once, and he reported himself a year later as being in perfect health. He writes: "I have been working at my trade—piece-work at boiler and machinery work (and riveting). This is very hard work, and yet I have felt very well since my operation."

I should like now to add a sixth case, in which my attempt to control the hæmaturia by cleanly cutting through the vascular arches at the bases of the pyramids resulted in a failure; in other words, a precise, clean, deep wound in the cortex was valueless in checking hæmorrhage from a varicosed papilla. This case is so clear and complete that I give it somewhat in detail.

Case 6. Two years' persistent hæmorrhage; cystoscopy; clean section of cortex of right kidney; no result; nephrectomy; cure;

specimen showing one papilla in lower middle calyx spongy and angiomatous.—Mrs. O—, æt. 40, was brought to me by Dr. O. Leeson. For two years there had been dark blood in her urine without any intermission. It began after taking some "physical exercises," but this may have been a coincidence. There was no clue to the source of the hæmorrhage, except its dark colour, which pointed to a renal origin. There was no pain anywhere, no frequency of urination or difficulty in the act. There was a marked family history of phthisis. Many saw her and many diagnoses were received. One prominent physician felt convinced it was villous papilloma of the bladder, so an operating surgeon dilated the urethra and examined the bladder digitally, but failed either to detect villous growth or the origin of the bleeding. The bleeding never ceased. She became lethargic, anæmic, depressed, and hopeless.

I saw her in September, 1902. The bleeding was absolutely symptomless, and Dr. Eastes reported that the urine contained only blood-cells.

Cystoscopy.—The right ureteric orifice was a little swollen; pouring out of it were large effluxes of dark bloody urine.

Inference.—A hyperæmic kidney; area of hæmorrhagic disease small, because secreting power is great.

Diagnosis.—Either growth of pelvis or an angiomatous papilla in a lower calyx.

Operation (September 26th, 1902).—Right kidney loose, fatty tissue slightly attached to cortex. It was freely separated and brought on to the loin. It looked healthy in size, shape, and colour. Pelvis and ureter were perfect. The sinus was perhaps a little hollowed. No stone. As there was no evidence of growth I diagnosed an angiomatous papilla, and explained my reasons for the following procedure to Dr. Leeson, who was assisting me. An incision was cleanly made along the convexity of the cortex of the lower third, and deepened with the knife until I considered I had reached the vascular arches of the lower pyramids. The wound was then stitched up by interrupted catgut sutures.

I reckoned that this incision had, in all probability, cut through the vascular arches of the lower two or three pyramids, and that the resultant scarring would arrest the hæmaturia.

The hæmaturia was not relieved in any way. In fact, I think it was worse. I sent the patient to the sea-side, and she returned more anæmic than ever. I obtained leave to nephrectomise.

November 25th, 1902.—Two months after the first operation I cut on to the loin and removed the right kidney. The patient never passed any blood after this.

Dissection of the right kidney.—On cutting into the pelvis to see where the site of the bleeding was, I found it divided into two primary tubular divisions—both healthy (Plate XIX).

In the lower, about the level of the commencement of the ureter, I noticed a small dark blood-clot in the mouth of a deep calyx.

On cutting up the track of this calyx, which proved to be short and truncated, a dark purple papilla appeared, and oozing from a bright point in its apex was a little blood. This was obviously the site of the persistent hæmorrhage of two years' duration: why had my incision into the cortex of September 29th not arrested the hæmorrhage? A scar ran almost to the base of the pyramid

FIG. 119.



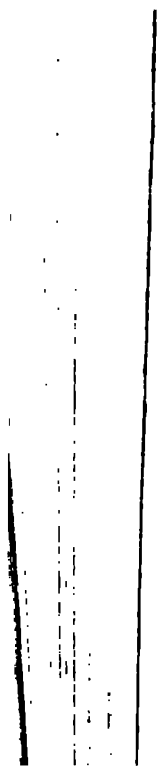
Angioma of renal papilla. Case of Mrs. O—. Magnified 10 diameters.

affected, but it had not gone through the vascular arches. Obviously I had not been *rough* enough. It was at once painted (Plate XIX), and then the papilla was cut out and sent to Mr. Targett for microscopy. He reports as follows:

"Kidney specimen.—A section of this specimen includes the greater part of the cortex of the kidney and the entire length of the enlarged papilla. The cortical tissues appear quite healthy, both as regards the glandular tubules and the glomeruli, but on passing up the papilla towards the pelvis of the kidney we find an extensive dilatation of the small vessels running in the papilla. Indeed, the



Angioma of a renal papilla, which bled continuously and freely for two years. Operation: cure.
(Author's case.)

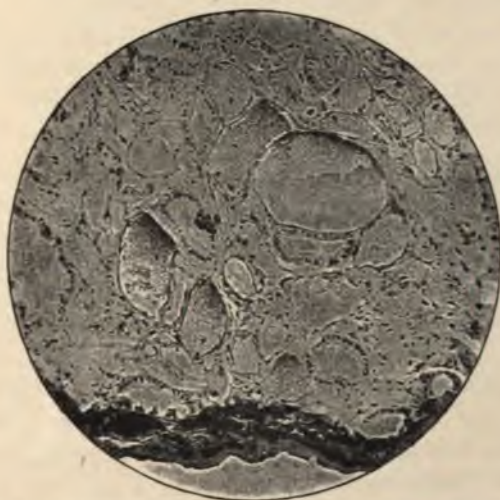


condition is so marked at the summit of the papilla that it constitutes a capillary nævus or angioma, and many of the longer vascular channels are distended with clot (Figs. 119, 120). In consequence of this growth of vessels the papilla is enlarged and the covering of transitional epithelium is greatly thinned (or actually wanting at the apex).

"The capillary vessels must therefore have been placed in direct communication with the cavity of the pelvis of the kidney."

With the experience of these six cases I feel I am justified in submitting that one cause, at least, of a

FIG. 120.



Angioma of renal papilla. Case of Mrs. O—. Magnified 80 diameters.

symptomless persistent renal hæmorrhage in the adult is traceable to a change in a papilla; that this change appears to the eye to be a spongy, varicose condition; that microscopy reveals its essential change to consist in a capillary nævus or an angioma; that either it has to be curetted out (papillectomy), or its blood-supply has to be thoroughly destroyed by rough tearing of that particular pyramid through a cortical incision. The particular difficulty of papillectomy is to find the papilla

affected, for it may be hidden deep in a long narrow calyx and escape detection. The pelvis has then been freely laid open to no purpose, for the bleeding continues (Case 3). The particular difficulty in breaking up the vascular supply of the diseased papilla from the cortex is the uncertainty as to where to find it.

Seeing, however, that the cases I have encountered have all been in the lower third of the organ, I should suggest the following :

In women where the kidney is readily displaced on to the loin the lower pelvis should be opened and inspected, and papillectomy be performed if possible.

That in men, with thicker muscles and shorter renal pedicles, an incision should be carried through the lower third of the cortex from the convex border, and the tissues torn down to the position of the pelvis by using the blunt end of the finger.

We read in the literature of such symptomless hæmaturias being cured by exploration of the pelvis with the finger through a cortical incision, that nothing could be discovered, and yet, to the manifest surprise of the surgeon, the patient was cured.

I have seen such cases terminate thus favourably in the hands of other surgeons who have asked me to cystoscope and indicate the origin of the hæmorrhage ; but the exploration was always roughly carried out, and the bleeding at the operation was free.

There are three points in connection with this subject I wish to lay stress upon :

(a) *Causation*.—I am uncertain as to the nature of this change. It may be that the papillary change is merely a small area affected by chronic interstitial nephritis. It may be the drag or torsion of the vessels of the kidney (for in most of the cases the organ was somewhat movable). If the former, why are there no casts or other evidence of renal degeneration? If the latter, why is it painless? (cf. p. 440).

(b) I do not suggest that all cases need operation.

The bleeding sometimes ceases under ordinary astringent medicine, and though one cannot diagnose the condition except by actual sight, it may be suspected by the process of exclusion. Walter G—, a boy of fourteen, was sent to me in May, 1900, by Dr. Bone, of Luton, with symptomless hæmaturia of the brown type. The bladder was beautifully clear; the right ureteric orifice was large in relaxation and elongated. The bleeding was renal. There were no casts or tubercle bacilli in the urine. Nothing was done. This hæmorrhage continued on and off for eighteen months; it then suddenly ceased. His health improved rapidly, and he has developed into a tall (six-foot), healthy-looking, well-developed lad. (Dr. Bone, September, 1902.)

(c) Lastly, I do not wish to convey the impression that this papillary change exhausts the causes for symptomless renal hæmorrhage existing in patients in whom the urine contains no evidence of chronic nephritis; I merely impress upon the reader that apparently it is not an infrequent cause, and that this has to be taken into account by any surgeon who undertakes to check painless and persistent renal hæmorrhage by operation.

3. *The Painless Hæmaturia of Benign and Malignant Growth of the Kidney.*

It is unnecessary here to enter upon the pathology and differential diagnosis of benign or malignant growth of the kidney. The subject is indeed sufficient for a volume. It is enough to show, in those cases in which the kidney or its pelvis is thus affected "latently"—that is, in which there is no objective or subjective evidence of the presence of the disease,—that the cystoscope is of infinite value, for it often enables the surgeon to select and to remove the disease before any swelling of the organ can be detected by the hands.

To interfere, or to interfere only when a renal tumour has made its appearance, is to do so too late.

Benign and malignant growth of the kidney or ureter manifest their presence in the pelvis *early* in 37 per cent. of the cases by a painless recurrent hæmaturia, and in this respect they resemble the softer forms of benign and malignant growth of the bladder.* In such cases it is often impossible to feel any renal tumour.†

In my experience the earlier bouts of this hæmaturia are usually sharp, the colour being bright, and often accompanied by clots, which form in the bladder. But I do not wish to convey the impression that every attack is severe. The general character of the bleeding is brighter than that usually noticed in chronic nephritis. Often the initial hæmorrhage is traceable to a strain, over-exertion, or a slight blow, and the repetition of the bleeding or the degree of its severity seems to depend much on the same cause. Some patients with multiple hard deposits in the mucous membrane of the pelvis are troubled by a persistent loss of blood, but this is uncommon. The general type consists of recurrent attacks, with intervals of *clear* urine.

Now a profuse recurrent painless hæmaturia necessitates skilled cystoscopy.

The clinician will generally be well advised if he examines in the interval between the hæmorrhages—with the water clear,—when, in fact, the bladder need not be washed out for the inspection. If nothing is discovered the patient must be re-examined when the hæmorrhage is present, and in this case the bladder must be irrigated and each ureteric orifice inspected to detect a bloody efflux.

* Cf. Author, 'Tumours of the Bladder, Operative and Inoperative,' p. 79.

† Compare Author, "Surgical Affection of the Kidney," 'Encyclop. Medica,' vol. vi, p. 80. In tumours of the kidney in children hæmaturia takes place in about 25 per cent. of cases. These are always or almost always sarcomata. In adults about 20 per cent. of the cases of malignant disease present hæmaturia as a prominent symptom. These are divided between the sarcomata and carcinomata. In carcinomata alone 75 per cent. of the cases present hæmaturia as a prominent symptom. (Quoted from Dr. Newman's 'Renal Cases,' p. 137.)

Ureteric Meatoscopy in Benign or Malignant Growth of the Kidney.

(a) *In the Interval between the Hæmorrhages.*—I consider the change in the ureteric opening most frequently noticed in renal growth which has affected the pelvis, to be a dull-coloured swelling and elongation of the opening, a condition which is so noticeable in pelvic dilatation (*q. v.*, p. 350), the orifice resembling the swollen meatus of the male urethra. In other cases the lips of the ureteric orifice of the affected kidney may be normal in size, but the edges may be roughened and the interior may appear coloured a dull red, just as if it had been lightly smeared with dull red blood. Such a condition is frequently seen in *recent* profuse renal hæmorrhage—the hæmorrhage having ceased. This roughened and stained condition of the lips is not a constant feature; I have seen some of the severest renal hæmorrhages emerge from the healthiest looking orifices. The absence of this appearance, therefore, does not imply that there has been no recent hæmorrhage; it merely points to the absence of epithelial abrasion by large clots being extruded, or to slight surface microbic necrosis.

Should *well-marked* vessel twigs radiate from the very edge of one reddened ureteric orifice, the inference that the corresponding kidney has been the source of the recent renal hæmorrhage receives strong corroboration.

Still more certain is it if the lips and the corresponding part of the *plica ureterica* be slightly swollen and finely stippled with red (as in the early stage of acute urethritis), for in this case clots have passed along the ureter as well as fluid blood, and have, by their size or their decomposition, evoked a slight ureteritis. The last condition can be sometimes confirmed clinically by a report that the patient has suffered from slight or severe renal pain or renal colic, this symptom varying according to the size of the clot and the duration and difficulty of its transit along the ureter. In advanced cases, where

there is an enormous renal tumour, I have seen the corresponding ureteric orifice bloodless, and of a *dead white*, while the other ureteric orifice has been in every respect normal.

b. During an Attack of Hæmorrhage.—But when renal hæmorrhage is present, an efflux of bright blood from one ureteric orifice is characteristic of severe bleeding into the corresponding renal pelvis. There is more bright blood than urine, the jet being correspondingly more solid than in the hæmaturia of chronic nephritis. Often a long cast, plug, or clot of blood will be seen projecting from the orifice, and obviously distending that part of the ureter which traverses the bladder wall. This distension is interred by a distinct convexity of that surface which runs beyond the orifice, upwards and outwards, in prolongation of the *plica ureterica*. This convexity casts a deep shadow in front or behind, according to the position of the light.

It may happen while the cystoscopist is examining the plugged ureteric orifice that the clot is suddenly forced out, and a stream of blood follows the projected clot, and suddenly obscures the light of the lamp.

In all such severe hæmorrhages I am sure the kidney ought to be explored without delay, with permission to nephrectomise, especially if the bleeding be recurrent and the patient above the age of forty.

Clinical Illustrations.—The more interesting group is that in which the growth finds its origin in the mucous membrane of the pelvis, and especially when the growth is of a papillomatous character. I will give two or three illustrations.

*Case 1. Villous carcinoma of the pelvis of the right kidney; profuse and obstinate hæmaturia, painless; no clue to cause or source; cystoscopy; right ureteric efflux of blood; nephrectomy; recurrence.**—I was requested by a well-known London surgeon to cystoscope a gentleman, æt. 70, who had suffered from hæmaturia of a profuse type for two years. It was accompanied by oxalate of

* Quoted in an article, "Value of Cystoscopy in reducing the Mortality of Nephrectomy," 'Trans. Med. Soc. Lond.,' vol. xx, p. 228.

lime crystals in the urine, but no symptoms pointing to the source of the hæmorrhage had been noticed. He had had various opinions. Oxalate of limestone in one or other kidney, growth of kidney (Sir W. Roberts), and villous growth of the bladder ranked chief among the diagnoses. He had been cystoscoped and sounded and generally overhauled, but the case still remained obscure, and though he was willing to have both kidneys and bladder cut into if he could be freed from the debilitating hæmorrhage, there was a natural unwillingness on the part of each surgeon who was con-

FIG. 121.



Villous carcinoma of pelvis and dilated calyces of kidney; nephrectomy; healed. (Author's case.)

sulted to go on the quest of a hæmorrhage which might after all emanate from a prostatic vein.

On passing the cystoscope I saw the right ureter was emitting swirls of bloody urine, and I strongly advised the surgeon who had invited my co-operation to cut down on the right kidney and to explore it. This was done. The pelvis appeared free, no hardness could be felt at any point, but the sinus felt to me much atrophied from back pressure. The operating surgeon declined to open the kidney or the pelvis, and I could see that he doubted my

cystoscopic finding. He closed the wound, and of course my connection with the case ceased. I heard indirectly, however, that the hæmorrhage continued unabated, and though no hint of actual blame reached me, it was palpable that the failure of the operation was placed to the credit of an inaccurate or a careless cystoscopy. The patient again went the round of the profession in London and Edinburgh, and after two years I was again asked to see him, this time by his London medical practitioner. He was now wasted, bleached, and exhausted, but his courage and calmness were remarkable. He explained to me that with but slight and rare intermissions the hæmorrhage had not ceased for two years, and he mentioned the fact that pieces of villous growth had been discovered in his urine by an Edinburgh surgeon. As villous growth of the bladder is comparatively common and that of the kidney very rare (eight cases in literature), I felt some uneasiness about my previous diagnosis of right renal hæmorrhage. I again cystoscoped. Again the instrument revealed hæmorrhage issuing from the right ureter, the orifice of which was much reddened and eroded. I therefore turned the patient over on to his side and removed the right kidney. Its pelvis was filled with villous growth, its cortex was honeycombed with cavities lined with the same growth (Fig. 121). The hæmorrhage at once ceased, and in a few weeks the patient was about. The specimen was examined by Mr. Targett, who reported as follows.

Report on kidney by Targett.—"The kidney is not enlarged. It has been laid open by a longitudinal incision from the convex border to the hilum. The cut surface shows considerable dilatation of the infundibula and calyces of the pelvis, so that the thickness of the glandular tissue is reduced to one eighth inch in many parts. The chief naked-eye features of the specimen on section are indicated roughly in the accompanying sketch" (Fig. 122).

Microscopy.—"Histologically the growth is exactly like one form of villous tumour which is met with in the bladder,—in fact, it is impossible to distinguish them. It is composed of coarse or 'fleshy' papillomata very closely packed together. These villi have rather delicate vascular cones, but are covered with a thick coating of transitional epithelium which gives them their fleshy nature. The neoplasm is evidently malignant, for the basis or subjacent renal tissue (much altered in structure) is becoming invaded by down-growths from the intervillary sulci, in precisely the same way as the bladder becomes infiltrated by a villous growth. Moreover the thin-walled calyx at the lower end of the sketch has become perforated by the new growth, a tongue of which extends to the outside of the

cortex. It cannot, therefore, be regarded as a simple villous or fimbriated papilloma, still less as a fibro-papilloma. The term malignant papilloma or papillary epithelioma would convey a better idea of its morphology."

A year subsequently the patient returned to me with hæmaturia, and expressing himself as fearful that the left kidney had become

FIG. 122.



Diagram of longitudinal section of villous carcinomatous kidney in Case 1, p. 408.

- A, A. Corresponding halves of a suppurating calyx, partially lined with growth or a thick pyogenic membrane.
- B, B. A large division of the pelvis and its calyces almost filled with a warty growth.
- C, C. Empty but dilated calyces.
- D, D. Appearance of growth on section. It is markedly striated, and measures three eighths of an inch in thickness. The surface is like a cauliflower made up of closely packed coarse villous processes or papillomata.
- H. The indurated fat in the hilum of the kidney. The reverse of the preparation shows that the hilum is practically filled with the cauliflower growth, which must have extended beyond it into the surrounding tissues.

attacked, or that the bladder had become similarly diseased. To my surprise, the cystoscope revealed blood coming again from the right ureter. Shortly before this Dr. Drew had shown at the Pathological Society a specimen of villous disease of the kidney, the corresponding ureter of which was studded with secondary

splashes of villous growth, implanted apparently by the urine stream from the original source.* It struck me at once that I had to deal with a ureter containing one or more villous tufts secondary to the original disease. I advised resection of the entire ureter. On exposing that tube I found that the upper end was globular and distended with villous carcinoma, but that the lower end below the pelvis brim was healthy. I resected the canal, therefore, down to the crossing of the iliac vessels. The character of the growth was similar to that found in the kidney. Fig. 123 represents the

FIG. 123.



Villous carcinoma of upper part of ureter, the lower part being free.

specimen. There was an uneventful recovery. The next phase was a large cocoanut-sized cyst containing blood, formed in the scar of the nephrectomy. This was excised. The wall was reported to be infiltrated by narrow branching processes of squamous-celled epithelioma.

I next detected a small growth of hard carcinoma of the prostate,

* Douglas Drew, "Villous Carcinoma of Pelvis of Kidney," *Trans. Pathological Society*, 1897, p. 130.

evidently a secondary deposit. He died uræmic, five years after the nephrectomy.

Case 2. Fig-sized villous papilloma springing from a lower calyx; profuse right renal hæmorrhage; nephrectomy; cure.—In October, 1897, Dr. George A. Davies, of Newport, Monmouth, recommended a doctor to consult me. The patient, a strong well-built man of 30, accustomed to the rough life of a country practitioner, gave me the following history.

In September, 1896, he suddenly passed pure blood. There was

FIG. 124.



Villous papilloma of pelvis of kidney. (Author's case.)

no frequency of micturition; no pain. Next day he had acute right renal colic; he then passed a long ureteric clot. Every now and then there was a trace of blood in his urine.

July, 1897.—His bladder suddenly filled with blood, necessitating the catheter. He was then examined by a provincial surgeon with the cystoscope, and told he had an ulcer in his bladder (probably the cystoscopist was biased by the fact that one sister of the patient had died of phthisis). When I saw the patient he was not

pulled down. He had a marked aortic diastolic murmur. There was much bright hæmorrhage in the urine. I cystoscoped him; both ureteric orifices were healthy, but the right efflux was bloody; the bladder was healthy. As he still had recurrent attacks of profuse hæmorrhage I explored the right kidney. The cortex appeared healthy, but the pelvis was distended with some soft material which proved to be growth. After nephrectomy a fig-sized and shaped papilloma was found springing from a lower calyx (Fig. 124).

Targett reports, February 11th, 1898, as follows:—This is a villous papillary growth from the pelvis of the kidney, and as far as the sections go I do not see any evidence of malignancy. It has a narrow attachment, and the intervillous spaces are well defined.

Patient writes saying he keeps well and active (August, 1902).

It has been suggested that villus-covered carcinoma of the mucous membrane of the renal pelvis is of slow growth and low malignancy. This is not always the case. We have no power of estimating the destructive or invasive capacity of any villus-covered growth springing from the mucous surface of the urinary tract. Some are slow in their invasion, and have a protracted lifetime; others are most rapid, and terminate the life of the patient quickly. Here is an example:

A clergyman, æt. 40, was sent to me by Dr. C. H. Hands, of Totland Bay. There had been hæmaturia in early life, and he had passed a calculus from the left kidney in 1899, pyelitis having been previously suffered from. The symptoms he complained of—pain in the left kidney, recurrent attacks of high temperature, pyuria, and hæmaturia—had been noticed for two and a half years only.

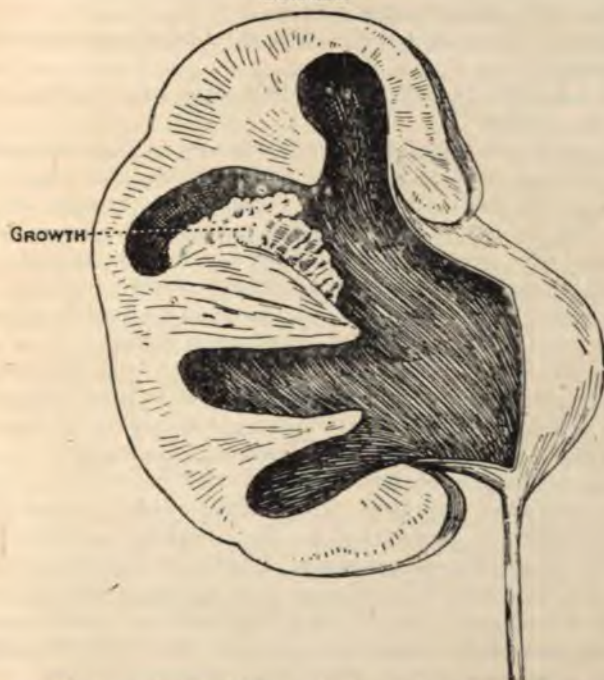
I removed a hollowed-out kidney, in the upper calyx of which was a patch of villous carcinoma the size of a half-crown (Fig. 125). I could not say if it was primary or secondary. Targett reported:

"The general characters of this growth are those of a papillary epithelioma resting upon a stratum of renal tissue and protruding into a cavity, such as the pelvis of a kidney. These papillary processes are so vascular that in places they may be called angiomaticous; they are covered with stratified epithelium. At the base of the growth there is abundant evidence of malignancy, for branching downgrowths of epithelial cells have penetrated the renal tissue."

Now although this was a clean removal, and no apparent growth was left behind, yet in the course of six months he had obvious

recurrence in the loin, groin, and supra-clavicular glands, and he died at the end of the sixth month after the operation.

FIG. 125.



Inflamed hydronephrotic kidney, with a patch of villous carcinoma in an upper calyx; nephrectomy; generalisation in six months. (Author's case.)

Case 3. Adenoma assuming malignant characters (?); five and a half years' hæmaturia from a small growth in the cortex of the right kidney; ureteric meatoscopy; nephrectomy; reported well six years later.—Mrs. C—, æt. 48; was brought to me by Dr. Jekyll in February, 1895. The patient gave the following history:

1891.—Nursed husband with cancer of liver for six weeks. Three months after his death she passed dark bloody urine, quite symptomless.

On and off since that date she has noticed slight recurrence, until in 1893 a rather profuse dark hæmaturia supervened.

November, 1894.—Bladder symptoms (frequency, pain, scanty urine, difficulty), then profuse scarlet hæmorrhage necessitating catheter.

February, 1895.—A little frequency ; a slight dragging ache over cæcum.

Cystoscopy.—Right ureteric orifice widely open, lips gelatinous; no efflux; left ureteric orifice healthy.

Diagnosis.—Carcinoma of right kidney. Advised operation, which was declined.

Lost sight of lady until October, 1895, when I received this letter from Dr. Jekyll:

"You may remember I sent Mrs. C—to see you about ten months ago, suffering from hæmorrhage from the bladder, which you believed to be due to commencing carcinoma of the right kidney. Since then she has been much better until lately, and now things are worse than ever. I cannot detect any lump in the side, and most of the symptoms have again pointed to bladder trouble."

Again interference was proposed, and again declined by patient.

Later on, June 11th, 1896, Dr. Jekyll again writes:

"During the last two months this lady has been much worse, with almost continuous hæmorrhage, so much so that I feel she is slowly dying. No enlargement of the right kidney can be detected. The slightest movement brings on alarming hæmorrhage."

The patient finally consented to operative interference. I cystoscoped December 18th, 1896. The bladder was full of dark blood and the urethra blocked with clot. Much washing out with a large litholapaxy cannula was necessary. Finally the medium was made clear, and then dense swirls of *pink* blood were seen pouring out of a much dilated right ureteric orifice. The urine had smelt recently; pus had been found in the urine, so that there was obviously a pyelitis in progress. There was no renal tumour to be felt.

The patient was turned over on to the left side and the right lumbar incision carried out.

Kidney densely adherent. Cortex covered by thickened indurated fat. A hard boss the size of a marble projected from the cortex of the anterior surface of the lower third. Ureter was the size and thickness of the vas deferens. Kidney removed.

On laying the kidney open from cortex to pelvis, obvious back-pressure dilatation was seen, the papillæ being flattened, the calyces dilated, and the parenchyma greatly atrophied.

Projecting into the pelvis was a swelling which was somewhat like a bluish external anal pile in size, shape, and consistence. This proved to be the pelvic projection of the small boss which had been noticed on the cortex. On cutting through this little lump from the cortex to the pelvis the centre started out just like a spinal intra-articular fibro-cartilage—reddish in colour, tough in consistence, and apparently contained in a dense fibroid tissue envelope.

Targett reported on it as follows, December 18th, 1896 :—" There is a small oval deposit in the substance of the kidney. Its external surface is covered with a dense fibrous capsule, but internally it protrudes into the pelvis of the ureter, having ruptured the mucous coat of that structure. On section it has a spongy appearance, some of the cysts being one sixteenth of an inch across, and many are recognisable with the naked eye. Microscopically the sections from the periphery show dilated and disorderly tubules like the convoluted tubules, and at first sight it does not look malignant; but deeper down there are many solid masses of epithelioma and narrow processes running into the fibrous stroma. Add to this the fact that it is protruding into the pelvis, and the evidence of malignancy is very strong. One cannot help speculating that perhaps this was originally an adenoma of the tubular type, and that it has assumed malignant characters of late. The nodulated condition of the inner surface of the pelvis and calyces is entirely due to chronic inflammation. In the face of so much evidence of inflammation I was at first inclined to regard the deposit as altered renal tissue, but I think now that the evidence of malignant carcinoma is definite. Some of these renal growths are very difficult to unravel."

Last letter received from this lady in New South Wales, dated July, 1903 :—" I am in excellent health. When you once told me I had commenced a fresh lease of life I had my doubts, but I have often thought since how correct was the surmise."

Case 4. Papilliferous carcinoma of middle third of unenlarged kidney; profuse hæmaturia nine months; ureteric meatoscopy; nephrectomy.—Dr. Boissier, of Banbury, brought me on October 10th, 1896, a gentleman æt. 59, with hæmaturia. Symptomless, intermittent, and profuse hæmaturia had been present for nine months, and it was expressly stated that there had been some *left* renal colic. No renal swelling could be made out.

I cystoscoped October 20th, 1896, having obtained permission to do what was thought advisable after the examination. The bladder was free, but a jet of arterial blood was seen issuing from the opening of the *right* ureter, then a clot was forced out of the orifice as if from a mould, and its exit was succeeded by another jet of blood. The lip of this orifice was stained with blood. The left ureteric opening was healthy. Dr. Boissier, who was present, was certain that the renal colic was left-sided, and yet the hæmorrhage was from the right. I had such confidence in the cystoscope being correct that I removed the right kidney at once, although it did not feel enlarged. A carcinomatous growth occupied the middle of the



gland (Fig. 126), and on questioning the patient subsequently²² found that he had misled us as to the side in which the colic pain had really been felt. The patient remained well for long, but died of cancer of the liver six years later.

FIG. 126.



Papilliferous carcinoma of middle third of unenlarged kidney.

Targett reported thus:—"The kidney shows a rounded tumour in the cortex which projects into the hilum on the one hand, and upon the convex border in the opposite direction. It is quite covered with a capsule externally. Microscopically it shows alveoli or spaces of various sizes, and these are filled with delicate branched papillomata. Each papilloma has a central capillary bearing a single layer of short columnar epithelium. Of course this structure cannot be made out everywhere. In some there are sections of tubes which might be intervillous spaces. However, the type is undoubtedly papilliferous, and resembles one form of malignant growth in the



Lower 4/5th of left kidney transformed into adrenal "rest,"
 Carcinoma: nephrectomy: healing.
 (Author's case.)

thyroid body. I presume the disease begins in the convoluted tubules, which become dilated and then filled with intra-cystic papilloma. It is obviously malignant."

Case 5. Very large adrenal rest carcinoma of the left kidney: intermittent painless hæmaturia for three and a half years; nephrectomy.—I was asked in September, 1902, by Dr. Charles Ewart, of South Kensington, to see a gentleman, æt. 57, who was bleeding profusely with the urine, but who had no symptoms which pointed to the origin of the hæmorrhage.

In April, 1899—three and a half years before I saw him,—the patient had a sudden attack of hæmaturia (darkish). This recurred and became intermittent and severe. It was quite symptomless. Finally he had clot retention, and severe bladder pain and distress whilst abroad. On his arrival home he was still bleeding, but was able to empty his bladder.

Cystoscopy.—No efflux from the left ureteric orifice, only a trickle of blood. Right ureteric orifice healthy. Bladder stained with blood here and there, but healthy.

Inference.—Hæmorrhage from the pelvis of a resting or inactive left kidney.

I now did what I should have done at first—examined the kidney, and immediately felt a resistance in the left flank and loin.

Operation.—I removed, with much difficulty, a large, hard, very adherent kidney from the left side; it was $5\frac{1}{2}$ inches long, $4\frac{1}{2}$ inches broad, and it weighed a pound. On cutting it longitudinally it had the typical appearance of an adrenal "rest" carcinoma, a diagnosis confirmed microscopically by Targett (Plate XX).

The patient did well, and I see him occasionally, but twelve months have not yet elapsed since the operation.

The record of clinical work is not worth much if failures and difficulties are not included. There must always be such. Uniform success is neither profitable nor conducive to progress. I append, then, two cases which I have had, the first demonstrating failure; whether in accuracy of diagnosing the side from which the hæmorrhage came, or in the renal exploration, I cannot say; and the other a difficulty which I do not see can be overcome.

A failure in diagnosis.—W. S.—, æt. 61, a patient of Dr. Frank Little, of Teignmouth, was admitted with a history of intermittent painless hæmaturia in April, 1900. This had first appeared in 1887 after a severe chill. Twelve years later, May, 1899, another attack

occurred in which he passed blood painlessly three times. The secretion was rather dark; there were no clots.

In December, 1899, another attack supervened, and since then up to date of admission the patient has had dark, painless hæmaturia with occasional clots every three weeks. He has been losing flesh.

There is some increased frequency, $\frac{2 \text{ hrs. D.}}{3 \text{ hrs. N.}}$

Cystoscopy.—Healthy bladder, somewhat fasciculated; left ureteric orifice larger than right, and a stream of red blood issuing from it.

Inference.—Left renal pelvis bleeding; kidney mainly healthy.

Operation.—Left lumbar incision. A healthy, firm kidney, with a small healthy ureter. I opened pelvis and examined it with the eye and finger; found nothing abnormal; replaced gland.

He died a year later, the hæmorrhage having continued at intervals; he became very emaciated and cachectic, and his medical attendant, Dr. Little, kindly sent me notes of the autopsy which he made. Left kidney—the one examined by the eye and finger,—weight $5\frac{3}{4}$ oz. "Considerable disintegration of medullary part; signs of hæmorrhage; a small stone was found in a calyx high up in the pelvis." Right kidney twice the size of left, $11\frac{1}{2}$ oz.; malignant growth infiltrating cortex.

I do not attempt to explain this case. I cannot say if the stone found in the left kidney had been the cause of the hæmorrhage, or whether the left ureter was mistaken for the right and the bleeding emanated from the carcinoma. It is, I believe, my only mistake in ureteric meatoscopy of blood effluxes. It carries these lessons:—Be sure of the side to which the bleeding ureter belongs; be thorough in exploring for stone if the pelvis is opened.

A difficulty in diagnosis.—D. R—, æt. 41. This patient was brought into the operating theatre at the London Hospital with profuse hæmaturia, so profuse that the case was deemed urgent enough for immediate attention. The bleeding had only been noticed a couple of days, but it was most alarming. There was no pain, and none had been complained of. No previous history of any illness or any symptoms was obtainable.

The bladder was distended with blood-clot and bloody urine. After much washing and suction of clot the viscus was finally rendered clear, and the following condition was seen:

Projecting from the right ureteric orifice was a buff-coloured clot.

The line of the ureter as it passes through the vesical wall was very protuberant, as if a hard clot was filling that section of the channel. To the right of the ureteric orifice was a small papilloma the size of three grape pips. This was obviously due to ureteric irritation, and not the cause or origin of the bleeding.

I therefore diagnosed carcinoma of the right kidney and proceeded to remove it. The gland was big; the true capsule was densely adherent to the perinephritic fat and as densely adherent to the gland. I cut into the pelvis and evacuated a large quantity of old decolourised blood-clot and pale beef-tea coloured urine, and the big kidney collapsed to a very small hollowed-out gland. I removed it. The pelvis was thick like an old hydrocele; the mucous membrane was of a dark maroon colour and furred with adherent recent blood. The hollowed-out recesses of the atrophic kidney had a similar appearance.

Now, as recent blood was removed from the bladder and old blood was found in the kidney, it was obvious that the ureter had been the source of the hæmorrhage and not the kidney, but the patient was too collapsed for further intervention, so that he was sent back to the ward.

The hæmaturia continued in a diminished form for some days, showing this surmise to be correct, then it gradually subsided; but it recurred in a few months, and was accompanied by a nauseating pain in the left lumbar region.

A year later this patient came again to see me. His right leg was enormously swollen and œdematous. I explored the stump of the right ureter in the hopes of detecting an impacted stone, but instead of this I found the tube thickened in its entire course to the size of two fingers. It was not only densely hard, but all along its surface were small, hard, shotty bodies. It reminded me of primary ureteric carcinoma* or of psorospermia of the ureter.† He died a few months later, and I had no opportunity of a post-mortem.

* Author, 'Tumours of the Bladder,' fasc. i, chap. i, p. 12, "Malignant Growth of Ureter."

† *Psorospermial cysts of the urinary tract*, a case of which was sent me by Dr. J. Arnold Jones, of Aberavon, and exhibited at the Pathological Society by Mr. Eve. The cysts were miliary in character and full of colloid material. The specimen was removed from a woman æt. 51, who died after seventeen days' profuse hæmaturia ('Brit. Med. Journ.,' p. 1173, May 25th, 1889).

(4) *Symptomless Hæmaturia in Rare Cases of Embedded Renal Calculus in the Adult.*

I have noticed that it is customary among consultants to suspect and even diagnose latent calculus of the kidney in cases of symptomless renal hæmaturia in the adult.

This may be, and often is, a correct diagnosis in the child, but, as a matter of fact, stone in the kidney of an adult very rarely produces blood without pain being experienced at some time or other in the course of the case; symptomless hæmaturia, as an onset symptom, marked the presence of a renal stone in only 3 per cent. of my cases. In nearly every instance definite and characteristic renal pain has preceded the blood, or has followed it so rapidly that a correct clue as to site and cause of the bleeding was obtained.

It may be asked, how has the impression arisen that symptomless renal hæmaturia may betoken stone? It is, I venture to believe, a common error to diagnose and treat a case by the *recent* history of its symptoms and progress. No question is put to the patient as to pain in early life. Now a kidney stone once fixed by the support of growing branches or otherwise embedded may cease to pain. It may lie latent or symptomless for years, and the fact that there has been a kidney pain may be altogether forgotten by the patient. But if, when the stone has become fixed, slight erosion takes place in the mucous membrane of the renal pelvis from pressure, blood may appear in the urine without pain or any other indication of renal stone. Such cases are sufficiently common to impress the literature or professional experience with the belief that a latent renal stone may cause symptomless hæmaturia. I repeat, this view is wrong; there is nearly always an old history of renal pain in symptomless renal hæmaturia due to stone. Here is a case in point. I will first give the history as taken out by the house surgeon, and then as checked by myself.

Miss E— (vol. xviii, p. 68), æt. 36, sent me by Dr. Oldfield.

House Surgeon's report.—One year and a half ago this patient noticed that she was passing bright red blood in her urine. It followed upon a severe "cold." There was no pain either in the loin or on micturition. The blood soon ceased, but recurred on walking or on the slightest exertion. There was an occasional bout of irritable bladder, but usually the patient retained the urine for four hours easily.

Diagnosis.—Symptomless hæmaturia.

My own history notes are as follows:—"The urine is alkaline, the deposit copious, and consists chiefly of huge crystals of triple phosphates and small aggregates of the same. There are also numerous crystals of stellar phosphates, some amorphous phosphates, and ammonium urate. With this there is some muco-pus and blood. No casts or renal cells; no tubercle bacilli."

On questioning the patient, I elicit the fact that when a girl she had had severe pain in the left kidney for ten years, that it gradually subsided and never returned. Diagnosis: phosphatic-covered stone in left kidney.

Operation.—I removed a large dendritic stone from the left kidney. The greater part of it was composed of lime phosphates, but one piece (? the nucleus) was oxalate of lime. Probably the oxalate had irritated the mucous membrane, causing pain for ten years. As phosphatic material became deposited upon it, it gradually grew, and was moulded by the calyces until the stone became fixed by its branches; the pain then ceased. An attack of epidemic influenza or a severe cold determined a congestion of the mucous membrane, and an erosion of the surface ensued, which could not heal in the alkaline tide of urine. Blood appeared in the urine, but was symptomless because the stone was fixed.

But to return, in rare instances stone in the kidney does produce a symptomless hæmaturia. Here is a case in point:

Case 1.—Mrs. J—, æt. 30. This patient was sent to me by Dr. Keser, in 1897, for examination. She had excruciating bladder pain, and her urine contained blood and pus. Her bladder had been washed out twice daily for two months without relief.

History.—Her father had died of phthisis. There was a family history of hæmophilia. She herself bled furiously on any slight cause, such as confinement, menstruation, extraction of teeth.

Two months ago she was seized with hæmaturia; she had a good

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(5) *Symptomless Renal Hæmaturia in Rare Cases of Deposit of Crude Tubercle in the Submucous Tissue of the Renal Pelvis.*

Probably the rarest cause for renal hæmaturia of the *painless*, symptomless type is the sloughing out of a deposit of crude tubercle in the mucous membrane of the renal pelvis. In such cases the hæmorrhage is profuse and alarming, but it is generally accompanied or rapidly followed by renal pain; in fact, although I have had over 200 cases of urinary tuberculosis, I cannot count more than six probable cases in which painless hæmaturia has been the onset of symptoms of primary renal tubercle. Even these are not absolute without the cystoscopy, because painless profuse hæmaturia occurs in primary vesical tuberculosis in 4 per cent. of all cases.*

G. S—, æt. 27 (O. P., vol. xvii, 22). Twelve months ago, after cycling, he passed bloody water; there were no other symptoms. The bleeding recurred at intervals after any exercise or exertion. Three months ago pain in right loin, of a dull aching character, and fixed. Now a right renal tumour and an evening temperature. Urine 1012, acid, albumen, pus; clumps of tubercle bacilli (Eastes). Lost sight of case.

I may add that I am always suspicious of urinary tuberculosis in the *profuse* hæmaturia of young people æt. 12—21.

Dr. Newman† has written on the subject and has given four cases, but all had pain coincident with the hæmaturia.

Routier‡ records a very convincing case.

* My last case was brought me by Dr. Hewer at Easthorpe, a young fellow passing occasionally pure blood painlessly and without any vesical irritability. This had been noticed for two years. The urine contained tubercle bacilli, and on the right side of the bladder and low down on the posterior wall were sharply cut, bloody edged, tuberculous ulcers. Also compare S. W— case, on page 186.

† Newman, "Hæmaturia an Early Symptom of Renal Tuberculosis," 'Lancet,' August 26th, 1899.

‡ Routier, 'Bull. et Mém. de la Soc. de Clin. de Paris,' vol. xxi, p. 148.

A man æt. 28, in whom the first symptom of tuberculosis was a profuse hæmorrhage, which continued seventeen days, followed by renal colic and a frequent desire to empty the bladder. Cystoscopy showed blood running from the right ureter. The kidney was removed, and tuberculous ulceration was found limited to two calyces.

Conclusion.—We have seen that five distinct pathological changes produce a renal hæmaturia, and that the bleeding may be present without other objective or subjective symptoms.

The cystoscope can not only demonstrate the absence of any bladder cause for the hæmorrhage, but it can correctly indicate which kidney pelvis is at fault, and decide as to whether the renal tissue is crippled or inactive or overactive. But of differential diagnosis less can be claimed for its use. The instrument may show the orifice to be elongated and darkly congested, from which it may be inferred that the renal pelvis is dilated; or it may demonstrate large trunklets entering and emerging, and thus raise a suspicion of renal growth, just as a left-sided, rapidly growing varicocele, after middle age, may hint at left renal cancer. It may warn the clinician that inflammatory trouble complicates the case by showing swelling and pouting of the ureteric lips, but it cannot be relied upon for more than this.

Every other method of examination should be utilised to determine the *cause* of the hæmorrhage. Chief amongst such diagnostic aids is microscopy: the clinician, however, remembers that a few casts* may be found in all three groups—chronic nephritis, malignant growth, and renal stone; but that when numerous they indicate usually a chronic granular nephritis.

Crystals, when numerous, and especially if of the lime

* Stintzing regards the absence of tube casts in chronic renal affections as characteristic of renal tuberculosis. This certainly will not prove correct when the disease has started from the bladder and irrigation of this viscus has been carried out, for a slight septic pyelonephritis may ensue, and casts are then found in the urine.

phosphatic type, indicate a possible phosphatic-covered stone. Clumps of abnormal cells not infrequently point to neoplasm. Radiography is of real value in negating stone.

The two diseases difficult to diagnose, except by exclusion, are the angiomata of the papillæ and the breaking down of crude tubercle in a calyx. It should, I am sure, be a golden rule always to explore every case of profuse renal hæmorrhage, and to be prepared for nephrectomy. Whilst in the persistent and moderate renal bleedings attention should be directed to the condition of the pelvic mucous membrane, in the profuse hæmaturia the cortex should be searched for the unevenness or hardness of carcinoma.

CHAPTER XXI.

HÆMATURIA ACCOMPANIED BY DEFINITE RENAL PAIN.

THE last chapter was devoted to the consideration of those renal diseases which proclaimed their presence only by blood in the urine—to cases in which the cystoscope deftly and wisely used was not only of value, but indispensable in outlining accurate and judicious surgical treatment.

But renal disease, symptomless with the exception of hæmaturia, is the exception and not the rule. Most often distinct and definite renal pain draws attention to the site of the disorder, and *generally* indicates the origin of the blood which is noticed in the urine.

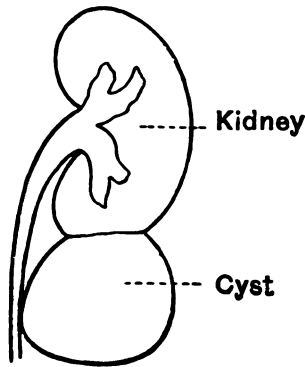
Under these circumstances some operating surgeons argue that cystoscopy is not only useless, but misleading; that pain is a sufficient clue to the locality of the mischief; and that a nephrotomy should be carried out on that side on which the pain is experienced. This advice is sound, but in my judgment not always safe. In the greater number of cases met with the pain is an all-sufficient guide to the disordered kidney. Occasionally, however, a slight pain is on the opposite side, and is always due, if I may venture the suggestion, *to increased activity of the sound kidney*, labouring to compensate for the crippled condition of its diseased fellow. This opposite side pain is in many cases not a referred pain, as some have contended, but due to increased local vascular tension. I therefore advocate very strongly the use of the cystoscope in all hæmaturias with *slight* renal pain.

I give a few illustrations of this, and one failure, when a routine cystoscopy was not carried out.

I was asked by Dr. Alfred Ryan, of Chelsea, to see a case of obstinate hæmaturia in a man *æt.* 36. The cystoscopy was carried out with difficulty and in an awkward position, but without noting which orifice I was looking at I saw a copious efflux of dark brown urine. As pain was complained of in the right kidney I concluded it was right renal hæmaturia, and said so. The bleeding remained obstinate; I found myself forced to interfere. Before doing so I re-examined with the cystoscope (as this is my routine practice). To my surprise the bleeding came from the left ureteric orifice. I cut on the left kidney. The patient was cured to the extent that the bleeding was arrested, and he had no further pain in the right kidney.

A lady was sent to me by Dr. Lloyd, of Abergavenny, for hæmaturia and pain and tenderness in the *right* kidney. With the cystoscope dark blood was seen to trickle feebly from the *left* ureteric orifice. I immediately operated upon the left kidney, and dis-

FIG. 127.



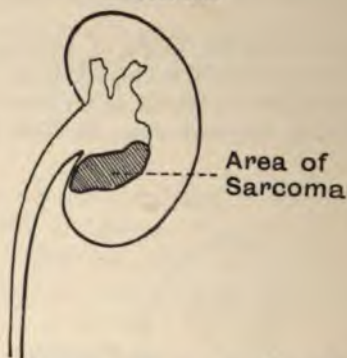
covered a large cyst projecting from the back of the tail (Fig. 127); it was full of blood-clot and grumous blood. It did not apparently communicate with the pelvis, but probably pressed on the vessels. I cut it freely away, stitching over the edges. The lady was cured, but always insisted I had made a mistake in operating on the wrong kidney.

J. D—, *æt.* 55, was sent to me by Dr. Chapman, of Hereford, with profuse hæmaturia. The patient had noticed it for two and

a half months. It was accompanied by pain in the right kidney and over McBurney's point.

On cystoscopy.—The right ureteric orifice was healthy, but the left was a large swollen-edged slit, such as one sees in a thickened ureter of long-standing renal inflammation. The efflux was a blood trickle. There was no renal tumour. I cut on the left kidney, and found it was much attached; I removed it. Its pelvis was dilated with a mass of loose sarcoma which had sloughed off from a mass of sarcomatous growth in the lower part of the pelvis (Fig. 128).

FIG. 128.



Sarcoma breaking into the lower pelvis of the kidney.

Slight renal pain may delude the cystoscopist into examining the wrong orifice. I have several times seen a cystoscope burn situated near the orifice of a ureter in hæmaturial patients who complain of renal pain or discomfort on the same side, but I have found blood issuing from the opposite ureter! In other words, previous observers have been so diligently and so fixedly watching the ureteric orifice of the painful side that they have burnt the periureteric area, and in addition have not noticed the hæmaturia issue from the other side. I could quote a number of cases on this point. Seeing, then, that pain is not altogether reliable, the use of the cystoscope in hæmaturia accompanied by *slight* local renal pain is advisable.

There is, however, another aspect of the subject,

and this deals with obstruction of the vesical orifice of the ureter by carcinoma of the bladder, a condition which necessarily evokes pain in the corresponding kidney on account of the back pressure exerted by the obstruction, in addition to hæmorrhage from the cancerous surface. The question should always be asked, "Is the renal pain caused by any back pressure exerted at or near the bladder orifice of its ureter?" In a fair proportion of vesical carcinomata this causation of renal pain is present, and it can be demonstrated by the cystoscope. I have had a very severe clinical lesson on this subject, and I quote the case in which I failed as an illustration.

H—, æt. 40, was sent to me by Dr. Smith, of Plumstead. The patient complained of right kidney pain which extended to the groin and bright hæmaturia on exertion; he had no other symptoms. Contrary to my invariable custom I did not cystoscope, but explored the right renal region, as the pain was so entirely local and renal in its position. A hard, movable, slightly hollowed right kidney was found. Nothing further was done. The operation was followed by retention and a difficulty in catheterisation, which made me examine the prostate and the bladder base. This latter was found indurated. He left the hospital but died of suppression. I obtained an autopsy, and proved that the right renal pelvis and ureter were dilated, the bladder orifice of the right ureter being blocked with cancerous growth. Had I followed my routine practice and examined him with the cystoscope I could have seen the vesical carcinoma, and would not then have subjected him to the useless operation of renal exploration.

It might hardly be credited that a benign villous papilloma, situated near the orifice of a ureter, could cause the corresponding kidney to "ache," or even to become the site of definite suffering. But it is so, exceptionally. I have met with a few cases.

Not long ago a boy of fourteen was sent to me by Dr. Henderson, of Balham, with symptomless severe hæmaturia and an aching left kidney. Over the left side of the belly was a long scar, evidently the route of a transperitoneal exploration of the left kidney. I learnt that the boy had been for three months in one of the London

hospitals, under one of our very able surgeons, and had had the left kidney explored, the diagnosis being malignant kidney; the organ, however, was found perfectly healthy. This was three years ago, and the symptoms had continued since then unchanged,—there was still profuse recurrent hæmorrhage and left renal pain.

With the smallest cystoscope I first demonstrated a large villous papilloma dragging on the left ureteric orifice, and then removed it supra-pubically. He was quite cured of the hæmorrhage and the renal pain.

But to return, marked attention was drawn in the previous chapter to certain hæmaturial affections of the kidney which were often painless. But "*painless*" hæmaturial diseases of the kidney are the exception, not the rule. In order to emphasise this fact, I propose to devote a few pages to several of those diseases of the kidney which entail suffering as well as hæmorrhage, and in order to arrest the attention of the rapid reader I will place these groups in parallel tables.

<i>Pronounced Hæmaturia without Pain.</i>	<i>Pronounced Hæmaturia with Pain.</i>
1. Chronic granular nephritis. (Not uncommon.)	1. Chronic granular nephritis, infected. (Rare.)
2. Angioma or capillary nævus of a renal papilla. (Rare.)	2. Local interstitial nephritis due to twist or narrowing of, or obstruction to the ureter. (Not uncommon.)
3. Benign or malignant growth of the kidney. (Not uncommon.)	3. Benign or malignant growth of the kidney. (Not uncommon.)
4. Cases of embedded aseptic calculus. (Rare.)	4. Calculus of the kidney. (Common.)
5. Submucous deposit of crude tubercle. (Very rare.)	5. Tubercle of the kidney. (Not uncommon.)

A cursory glance at the two columns will show that they contain almost identically the same forms of disease, so that one might say every disease of the kidney producing blood in the urine may have a painless or a painful course.

1. *Pronounced Hæmaturia in Cases of Chronic Granular Nephritis with Local Pain as a Prominent Symptom.*

The clinical life of granular kidney, or, in fact, of any chronic form of so-called Bright's disease, is rarely marked by any local pain, if we except the dull ache which is experienced across the back. Cases, however, are met with in which chronic nephritis is associated with marked pain in the region of one kidney, the suffering being localised to the front and to the back of that organ.

This epiphenomenon—pain—appears in most cases to be due to the presence of some disturbing influence which is present in addition to the nephritis. Thus uratic or oxalic gravel will determine a renal ache in a kidney affected by chronic nephritis, and may indeed induce decided suffering.

Mobility of a granular kidney is another and, I believe, a frequent cause for the additional symptom of local pain, some back pressure on the pelvic mucous membrane being exerted by the bending or kinking of the ureter.

Inflammatory changes ascending the ureter and invading a granular kidney in women from even a transient cystitis acquired during pregnancy, or under other circumstances, have been in my opinion an occasional cause for local renal pain in chronic nephritis.

Finally, there are cases in which no cause can be discovered for the pain beyond the nerve disturbance which is invariably associated with that crumpling of the cortex which is the pathological characteristic of the disease.

At present we may divide the accessory influences which graft unilateral pain upon the symptoms of chronic nephritis into three groups: calculus irritation, pelvic distension, septic infection.

The intercurrent affections need not be discussed here, but a few remarks upon the obscurity which they import into cases of chronic nephritis may not be inappropriate.

The Similarity between Irritated or Infected Nephritis (Hæmatogenous), and so-called "Surgical Diseases of the Kidney."

Cases of irritation or infection of a kidney which is already the subject of chronic nephritis fall into a class which is clinically intermediate between the so-called medical and surgical diseases of the kidney. In such borderland cases there is often much obscurity in diagnosis, and occasionally some uncertainty about the propriety of operative interference.

Take, for instance, the similarity which exists between an infected chronic nephritis and aseptic stone in the kidney. In both there may be unilateral pain, a few casts, a little blood, a little albumen, even a medium specific gravity; no marked arterial tension nor any cardiac hypertrophy. The fact is, expert urinalysis, with its improved appliances, especially the centrifuge, has weakened and confused the abrupt lines and limits which we are accustomed to employ in separating these diseases.

If we diagnose superficially and rely on the subjective signs of pain, infected nephritis may resemble renal stone very closely.

For instance, the symptom of renal colic which is so much relied upon as diagnostic of renal stone may be simulated by interstitial nephritis.

Mr. Mansell Moullin records a case of a woman æt. 34, who was admitted into the London Hospital for right renal colic, from which she had suffered at frequent intervals for two years. Between the attacks she had chronic and persistent aching across the loins. She passed urine frequently, sp. gr. 1012—1014, 40 oz. per diem, which contained blood, and a small quantity of albumen when blood was absent, and generally a deposit of urates. Casts are not mentioned as being present or absent. The arteries were hard and the heart slightly hypertrophied. There were no retinal changes.

Exploration of the kidney was carried out, but no stone was found, and the colics continued after forty-eight hours greater even in severity than before. The woman died a few days after the operation of exhaustion. On post-mortem nothing was found but well-marked granular kidneys.*

But the suffering in these exceptional cases of complicated chronic interstitial nephritis may extend beyond the limits of the kidney area. It may be located in the bladder, and the patient suffer greatly in that organ. In such cases it is not necessary to regard infection as a necessary cause. Extravasation of blood under the mucous membrane may be the disturbing factor.

In one case of granular nephritis which came under my care all the classical symptoms of stone in the bladder were present—pain, frequency, and blood. On cystoscopy, however, the causation of the lower urinary symptoms was proved to be an extravasation of blood under the mucous membrane around and in the neighbourhood of the ureteric orifice, an extravasation which did not probably differ from other hæmorrhagic manifestations noticeable in granular nephritis, such as epistaxis, hæmatemesis, melæna, yet its presence in this particular part of the urinary tract was sufficient to induce intolerable suffering and to mask the real site and cause of the trouble.

The Value of Cystoscopy in Infected Bright's Disease.

Of what value is cystoscopy in chronic nephritis with pain? It is rare to find any change in the ureteric orifices. There may be evidence of inflammation of the bladder and swelling of the ureteric orifice, and upon these grounds the cause of the pain and the source of infection of the kidney may be surmised,—or the ureteric orifice of the painful side may be turgid, and dilatation of the pelvis diagnosed; but I do not consider that

* 'Clin. Soc. Trans.,' vol. xxv, p. 56, 1892

cystoscopy will throw much light upon the diagnosis. It merely enables the surgeon to select with certainty the kidney if it is bleeding. If only local suffering is present it can only aid us by eliminating all sources of vesical disease causing renal pain.

Diagnosis and treatment.—In dealing with a case in which marked renal pain is accompanied by slight evidences of chronic nephritis I rely upon very thorough and repeated microscopy of the urine, upon careful examination of the blood and cardio-vascular system, and upon evidence of functional disturbances in the digestive, respiratory, nervous, and cutaneous tracts to establish the presence of confirmed nephritis. I do not hesitate to advise exploratory incision * if retinal splashes are absent and cardio-vascular changes are slight or unimportant. Edebohls does not hold his hand even for these evidences of advanced Bright's disease.† If the kidney aches because of its mobility, the mere operative manipulation is sufficient to fix it. If the kidney is painful from ascending inflammation, the blunt separation of the cortex from all adhesions is quite enough to relieve the patient of pain for an entire year. Moreover, if the capsule be reflected after Edebohls' method, there is some chance of improving the future health of the kidney.

Exploration, in such cases, is surgical, if it be under-

* I believe a small proportion of cases of *negative* kidney exploration for stone are instances of irritated or infected chronic nephritis.

† Edebohls says: "Of the thirty-two cases of advanced chronic nephritis operated upon during 1902, very few indeed were uncomplicated or but slightly complicated cases of chronic Bright's disease. Nearly all presented minor, greater, or extreme cardiac and vascular degenerations, arterio-sclerosis, hypertrophies of all degrees up to the point of non-compensation beginning, predominant dilatation, pericarditis, and endocarditis. Pleuritis and hydrothorax as complications were by no means rare, while one patient had cavities in both lungs, and two patients suffered from cirrhosis of the liver in addition to chronic Bright's disease. The cerebral and ocular complications were represented by hemiplegia due to changes in the cerebral vessels, to embolism, thrombosis, etc., and by the characteristic retinal lesions." The mortality was 13½ per cent.—'Med. Press and Circular,' April 29th, 1903, p. 429.

taken with the knowledge that the kidney structure is affected, and if the line or method of attack be modified accordingly.*

2. *Pronounced Hæmaturia with Pain in Local Interstitial Nephritis (Non-hæmatogenous).*

Local interstitial nephritis is a wide and difficult subject. A few prefatory words are therefore needed to designate the exact class I wish to draw attention to.

It is well known that a localised form of chronic interstitial nephritis follows the healing of wounds, abscesses, infarcts, and gummas in the kidney, the destroyed tissue being eventually replaced by scar tissue, and the surface of the organ being correspondingly puckered.

These several conditions may be localised to small portions of the kidney or involve the entire organ, but are not coincident with somatic changes. As a rule † they are

* It is always judicious, I think, to avoid laying open the kidney structure freely when there are obvious signs of chronic parenchymatous or interstitial nephritis present.

† An exceptional case from my case-book:—Infarct of the kidney; severe pyelo-nephritis; persistent hæmaturia; cystoscopy; nephrectomy; cure.—Dr. Sykes, of Croydon, sent me a gentleman, æt. 40, with the following letter:—"This case is characterised by an absence of all symptoms but bleeding, and it has been mooted to make an exploratory incision down to the *left* kidney. Lawson Tait and I think the symptoms are too vague to justify such a course at present, and we should like your advice." The gentleman had been passing dark blood for some months. There was no tubercle in the urine, only blood-cells.

Cystoscopy (April 7th, 1899).—A decided whipcord-like mould of darkish blood was seen issuing from the *right* ureteric orifice. The left ureteric orifice was patched with extravasation, which I supposed was the result of a recent cystoscopy made by an inexperienced operator.

Inference.—Right renal hæmorrhage from an inactive kidney.

Operation.—Right lumbar incision. Kidney *not* movable. Dark blood beneath true capsule, which was raised over considerable areas, especially towards the lower pole, and stripped off only too readily where it was not already detached. The kidney surface was decidedly granular. Its consistence varied, here firm, there thin and dimpling. I removed it, finding it very adherent at the upper end. It was hollowed out in every part, the cortex being a mere shell towards the lower pole (where

not accompanied by persistent or marked hæmaturia, and I do not propose to deal with them here.

There is another form of local interstitial nephritis which is usually more or less of a diffuse form, and follows pyelo-nephritis. It is to this, and more especially to a variety of this, I wish to draw attention.

The severity and extent of the interstitial nephritis depends, of course, upon the degree and duration of the exciting cause. In most, the change is at first limited, and this is the time for operative relief, for it is always *progressive*, and ends with the entire destruction of the gland.

The cases are often obscure clinically, and many, I am sure, have been diagnosed and treated as Bright's disease in the past; even now they are liable to be confused with infected or irritated Bright's disease. A very excellent illustration of the similarity is recorded by Dr. Bagshawe* in the 'Pathological Transactions.'

The case was that of a man who died at the age of 62. At the age of forty-two he had dropsy and general anasarca, and he was told he would always be liable to it; but he recovered completely, and on his death, twenty years later, from suppression of urine his left kidney was found atrophied and the ureter impervious. The right weighed 7 oz. and its structure generally was healthy, though microscopically some evidence of disease was found, and the gland had suffered from backward pressure.

Death was due to suppression arising from the block of the right ureter by a dark-coloured plug of calculous *débris* and blood.

It might be fairly surmised that the dropsy and general anasarca was due to sudden incapacity of the left kidney

(the true capsule had been found detached). The mucous membrane lining the recesses was darkly blood-stained. A pale long clot was removed from the pelvis.

The section of this kidney shows a triangular patch of chronic inflammatory growth extending inwards from the cortex. This is very probably the remains of an old infarct.—J. H. TARGETT.

* "Suppression of Urine for Ten Days," by Dr. Bagshawe, 'Path. Soc. Trans.,' vol. xvi, p. 176.

twenty years before death. May not some of the cases of transient severe albuminuria be due to plug of the renal artery or embolism in the renal substance, which places the whole or part of the kidney *hors de combat*?

Three main causes are, I submit, provocative of local interstitial nephritis (non-hæmatogenous).

a. The most common is inflammation of the lower urinary tract ascending one ureter (or both).

b. Some form of ureteric obstruction—either an acute bend of the ureter, due to adhesion or mal-insertion in movable kidney, or a valve, or a vessel-leash bowstringing the ureter, or a stone impacted low down in the ureter. In all, there is generally infection in addition to the obstruction.

c. Intermittent strain on the renal vessels.

I do not wish to burden the text with examples of the first or of the second class. One striking illustration will suffice.

Kink of ureter at the uretero-pelvic junction; back pressure; hollowing of kidney; chronic pyelo-nephritis; severe hæmorrhages and renal pain.—A gentleman, æt. 33, consulted me in reference to attacks of right renal pain and hæmaturia. His mother had died of phthisis. His symptoms had lasted ten years, but were increasing in severity. He described the attacks as follows:

"The attacks now come on about every three weeks at night, and last from twelve to forty-eight hours. It commences with a feeling of discomfort at the back of the right kidney, sufficient to wake me and keep me awake. I cannot lie on that side nor on my left, but turn on to my back. It soon becomes real pain and spreads to the front of the kidney, but not to the bladder. Both back and front become exquisitely tender. I do not wish to make water often,—in fact, there seems a scarcity of urine, but what I make is quite clear. I usually vomit with the pain. The end of the attack is often announced by a feeling of something giving way, and I get up at once, being seized with a sudden and great desire to urinate, and pass at once 14 to 17 oz. of brightish blood and water. The pain is now gone, and the blood gradually diminishes and is gone in a week. In between the attacks the urine is clear, and contains only oxalates.

"Alcohol, constipation, and flatulence seem decidedly to bring

on attacks. Contrexeville cures are useless, but Carlsbad (Sprudel) courses are beneficial, so also is a liver pill. Between the attacks I am in perfect health."

An exploratory operation was performed. The kidney was found to be somewhat shrunken and hollowed out by back pressure; the pelvis was distended, and the ureter narrowed at its junction with the pelvis and somewhat kinked. It was repaired in the usual way, and the patient regained his health.

I have had several almost similar cases.

*Intermittent Strain or "Tug" on the Renal Vessels,
producing a Local Chronic Interstitial Nephritis
which is characterised by Renal Pain and Blood.*

Some time before Newman* drew attention to the subject "of increased vascular tension in the kidney as a cause of renal pain, hæmaturia, and albuminuria with or without tube casts," I had been forced to accept as a working diagnosis that drag or tug upon the renal vessels, especially an aberrant artery to the lower lobe of the organ, was liable to induce local interstitial nephritis and to cause pain and blood.

I first met with it in a case of movable kidney, feeling a thick artery like a radial passing to the lower pole from below (*vide* Fig. 129). The thought at once passed through my mind that this aberrant vessel acted like a tent guy, and prevented the kidney being in its place under the liver. But while the kidney remained loose, every drag upon it would do harm to that area of the renal tissue supplied by the artery. I did not divide and tie the vessel, but fixed the kidney in the loin so that there was no strain placed on the vessel. The patient lost all her symptoms.

Since then I have had cases in which I could not resist the conclusion that drag on the vessels is more often concerned in atrophy of parts of the kidney, and in patchy surgical interstitial nephritis, than I had realised

* Newman, 'Renal Cases,' p. 1, 1899.

at first. It is quite conceivable that any sudden interruption of blood-supply must have a deteriorating effect upon the delicate renal tissue; and when this interruption takes place, as it may do several or many times a day by the drag of a recently displaced kidney, or by the sudden stretching action exerted on the vessels by a dilated

FIG. 129.

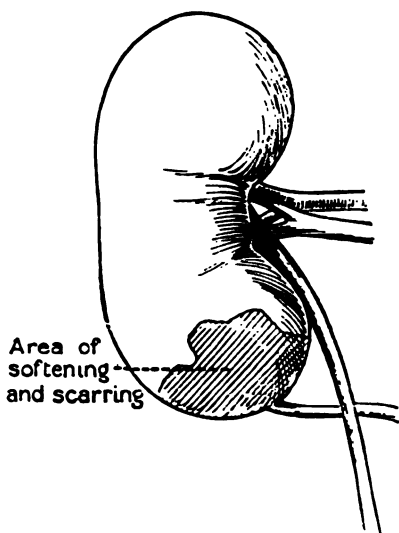


Diagram of irregular artery to lower pole, the area of softening and scarring being found when there was a distinct drag on the artery.

pelvis, that congestion, inflammatory exudation, and atrophic changes must result, and the clinical symptoms of albuminuria or of hæmaturia may ensue.*

* Dr. George Robinson showed that obstruction to the renal vein caused both hæmaturia and albuminuria ('Med.-Chir. Trans.,' 1843). Senator proved that by obstructing the renal vein for a short time in a living animal albumen and blood could be easily detected in the straight tubes, while Bowman's capsules were free; but if the pressure were more prolonged, the mechanical hyperæmia caused blood to escape into the Malpighian capsules also. Herman and Overbeck have demonstrated

Now it is conceivable that the leash of vessels most liable to be dragged upon is that running to the lower pole (Fig. 130), because they are more often stretched by the greater mobility of the freer end of the kidney; but if the vessels are inserted near the upper pole, as they sometimes are,

FIG. 130.

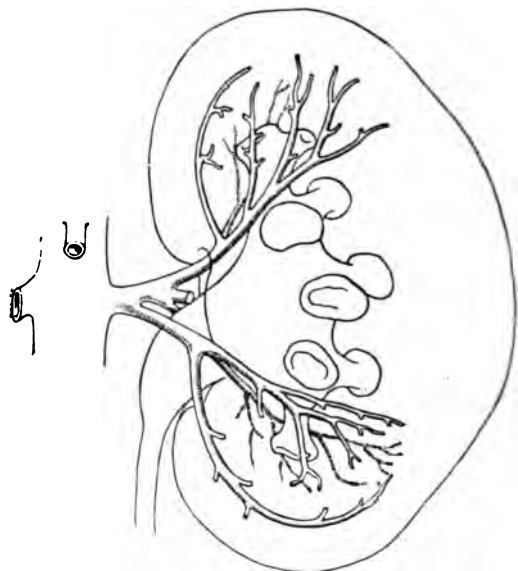


Diagram of arterial supply to kidney. (Max Brödel.)

and course over a distended pelvis, they are also liable to overstretching in proportion to the distension of that cavity.

I suggest that there are two appearances of the kidney (when lying *in situ*, with its vessels unstretched by delivery on to the loin and its cortex undamaged by manipulation) which may give a clue to the presence of

that even slight disturbances of the renal circulation cause suppression, which may last for a longer or shorter period according to the sensitiveness of the individual, and that albumen and blood may appear in the urine for hours and days afterwards. (Quoted from Newman, 'Renal Cases,' p. 16.

local interstitial nephritis due to intermittent drag on the vessels :

- A. Abruptly Marginated Whitish Areas of the Cortex.
- B. Dark Blood Bullæ with Detachment of the Capsule.

A. Abruptly margined whitish areas of the cortex.

The lower pole, even the lower third of the kidney, may be seen to be of dull white colour. This area is sharply marked off from the dull red of the remainder of the apparently healthy cortex. The capsule over the area may strip at a touch, or it may come off with difficulty, and then little patches of the cortex come away with it. This difference in capsular detachment varies according to the age and stage of the patch of nephritis. The cortex of the impaired area is usually smooth, white-greyish-yellow; it is soft, and tears easily (Fig. 129). Section from it shows a fatty change in the epithelium and a marked state of chronic nephritis. Sometimes the surface of the area is distinctly granular, but I have never seen this change so abruptly limited as the whiter.

It is right to say that in the cases of "white areas" I have studiously avoided those in which the change could be attributed to "corset pressure" on the kidney; but even here, according to Rovsing of Copenhagen, torsion of the pedicle may produce hæmorrhage. One of his cases is as follows :

Mrs. P—, æt. 56, admitted May 17th, 1897. She had been perfectly well until 1885, when, after a fatiguing day's washing, and after having lifted heavy tubs, she noticed blood in her urine. This bleeding recurred twice in twelve years, each time after severe exertion.

On admission she was of a dirty cachectic aspect, and was emaciated. On the right side a large, hard tumour could be felt in the kidney region. Cystoscopy showed a considerable stream of bloody urine from the right ureter. The urine did not have any smell. It was of a deep, dark blood colour, and yielded a high red deposit, which under the microscope showed numerous red, a few white corpuscles, and many small motile bacilli, found on cultivation to be *Bacterium coli*.

The diagnosis was malignant tumour of the right kidney.

On the 20th of May, 1897, right lumbar incision was performed under chloroform. Rovsing found the kidney displaced downwards in a remarkable oblique position, with its upper pole turned towards the vertebral column, the convex border turning forwards and upwards, so that the kidney seemed to have made half a turn upon the pedicle. The kidney was kept in this position by the very pronounced lacing-liver, the furrow of which was exactly opposite to the upper edge of the kidney, whilst the kidney was behind and adherent to the posterior surface of the lobe of the liver, so adherent that it could not be detached without making a 2-inch split in the peritoneum. It was evident that the hard tumour Rovsing had felt was kidney *plus* liver, not the kidney alone. The kidney, which was certainly a little enlarged, being especially longer than is normal, and bluish on the surface, was brought through the wound. Forceps were placed on the pedicle, and a complete division of the kidney from the convex border into the pelvis was then performed without any bleeding. The tissue was cyanotic, but otherwise normal in appearance; no calculus or tumour could be found; the pelvis perhaps a little dilated, its mucous membrane smooth and pale. After excision of a piece of tissue for microscopical examination the kidney was united with catgut sutures and replaced in its normal position, where it was kept by a pad of sterile gauze placed beneath its inferior pole, after which the lumbar wound was closed.

The next day (21st of May) the urine was clear, not tintured with blood. On 1st of June the urine did not give chemical blood reaction, but a slight quantity of albumen. On 7th of June the urine was without albumen, but there was still *Bacterium coli*. After two months' treatment with salol and distilled water (1½ to 2 litres daily) the urine was quite sterile. During the year which has elapsed since operation the patient has been quite healthy and the urine normal (last examination on the 2nd of July, 1898).

The *microscopical* examination of the extirpated tissue showed stasis in the veins and the capillary vessels. No infiltration of round-cells. In the tubuli recti a number of small staff bacteria.

Rovsing* remarks on this case, "I suppose that the bleeding was caused by the stasis in the veins produced by the torsion of the pedicle of the displaced kidney."

* 'Brit. Med. Journ.,' 1898, part ii, p. 1547.

*Author's Case illustrative of Change in Lower Lobe, the Probable
Result of "Drag" on Vessels.*

A patient, æt. 23, was sent me by Dr. Greene, of Cheshunt. She had been in various institutions with a right movable kidney, pain, and hæmorrhage. Various appliances had been tried, but all had proved unsuccessful.

On cystoscopy the right ureteric orifice was thin and open, but the left ureteric orifice was much more affected than the right.

As the pain was right-sided and the kidney was freely movable, whilst the left kidney could not be felt, I cut on the right.

The kidney was long and hollowed by back pressure. A leash of vessels entered the pelvis at the usual position, and a separate leash ran to the tail from below. The lower third of the organ was white, softened, and scarred (Fig. 129). Upper two thirds appeared quite normal.

I fixed the kidney. She recovered, and a year later was free from symptoms.

I may add the following cases which bear on the subject. Both seem to me to be good examples of the evil effects upon the renal tissue of the action of the combined forces of pelvic or ureteric obstruction and stretching of the renal vessels.

Case 1. Bowstringing of ureter by an aberrant artery to lower lobe of kidney; dilatation of pelvis; extreme atrophy of parts of kidney supplied by aberrant artery.—A lady, æt. 41, was sent to me by Dr. Pinching, of Gravesend. She had "influenza" in November, 1898, and noticed a cloudy deposit in the urine. It has been habitually murky since then. In February, 1899, another attack of "influenza" starting with a rigor. Since then an increasing bodily weakness. September, 1900, another rigor, after which she passed porter-coloured urine without vesical irritability. Severe occipital headache and fever. In four weeks she had six separate attacks, each being heralded by the *water clearing*, the temperature rising, and culminating in a rigor. Pain was then felt in the left kidney, pus appeared in the urine, and the attack subsided without sickness. No tubercle bacilli were found in the urine.

On cystoscopy the bladder was shown to be healthy, and the right ureteric orifice pumping freely a urine of low specific gravity; but the left ureteric orifice was oval and open, and it worked with much spasm of the adjacent interureteric bar.

Diagnosis.—No stone or tubercle, but a dilated left kidney. Cause unknown.

Operation.—Left lumbar incision.

Kidney very adherent, much atrophied, parchment patches alternating with islets of thick cortex. It proved to be a multilocular sac. I removed it by skinning it out of the capsule, but it was much attached, and I was forced to leave here and there patches of russet-brown kidney tissue adhering to the capsule. The pelvis

FIG. 131.

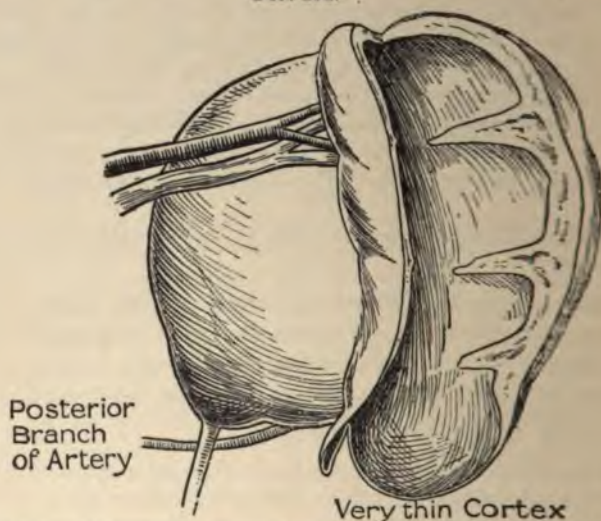


Diagram of irregular artery, bowstringing the ureter, which probably caused spasm in the artery, and therefore an intermittent vascular supply to lower lobe.

was dilated; the vessels were in two groups (*vide* Fig. 131), an upper and a lower, and the latter crossed the ureter just where it joined the dilated pelvis. It was noticeable that the lower pole of the kidney—that supplied by the lower vessel leash—was white in colour and so atrophied as to be thin as parchment, but the upper had a thicker layer. There was no stone.

This suggested to my mind a vicious circle; the vessels had been bowstringing the ureter, perhaps setting up a local spasm in that tube at the site of crossing, which would further accentuate the back pressure caused by the mere flexure, and had produced the dilatation of the pelvis. There was no true stricture of the ureter—14 E passed easily.

It also seemed to me that the intermittent extension or pull on the lower leash by the varying movements of the lower pole in distension had induced the marked atrophy of the lower pole.

Another case :

Case 2. Extreme atrophy of upper pole of kidney; dilated pelvis and ureter from stricture of lower ureter; overstretching of renal vessels.—Mrs. J—, æt. 37, had suffered from attacks of pain in right kidney, pyelitis, and intermittent ureteric block ever since remova

FIG. 132.

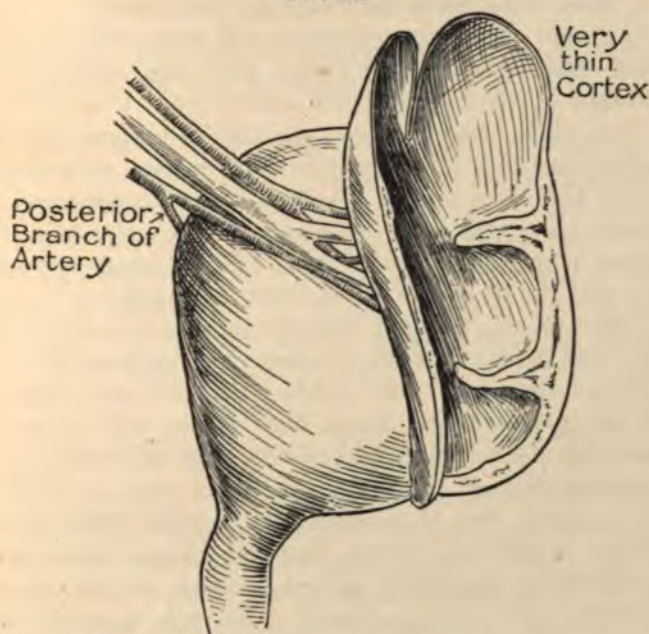


Diagram of dilatation of pelvis stretching upper leash of renal vessels.

of the right ovary. I found on cystoscopy the right ureteric orifice enlarged and patulous, the left healthy. I explored the right kidney, and found it and the entire right ureter down to the position of the ovary very dilated. The upper lobe of the kidney was fixed, dilated, and the cortex there was as thin as cartridge-paper—much adherent to the liver (Fig. 132); the pelvis was much dilated, and as the vessels were inserted high up they must have been subjected to severe overstretching when the ureter became temporarily closed. The vessel running behind the pelvis to the tail escaped, perhaps, for there was much more cortex in the area supplied by that artery than anywhere else. I roughly formulated for myself, trusting to

future experience to correct the errors in interpretation and supplement deficiencies in observation, the following rule:

If a leash of the renal vessels is so placed as to be intermittently overstretched or spasmodically affected, that part of the kidney structure supplied by it will suffer, becoming thinner and softer than those more equably supplied with blood.

B. Dark blood bullæ with capsular detachment.

Now and again the operator will meet with a blood blister—the capsule being raised from the cortex by a collection of dark fluid blood and urine. I considered at first that this was due to the roughness of my manipulation, but I have met with it in cases of movable kidney, and have noticed it before I have commenced to separate the organ from its bed. I have also found it present in cases of inflamed fixed kidney, where it would seem that the blood-supply has been damaged.

I have usually found it towards the lower pole of the organ, but it may be quite extensive and embrace half or nearly all the gland. On tearing the detached capsule and sponging off the blood, the surface will be found coarsely granular, and perhaps with scars of commencing interstitial change. I believe in every case in which I have noticed this detachment of capsule with blood between it and the cortex, that the vessels have been intermittently stretched, and the tissue of the gland, especially the cortex, affected. No kidney with this condition has appeared to me healthy; in all I have noticed some local inflammatory change (local interstitial nephritis) which ultimately might lead to scarring.

The remaining items of the group need not detain us here. Pain in the kidney, with hæmaturia, is among the characteristic and most frequent symptoms of renal carcinoma, stone, and tubercle. The value of ureteric meatoscopy in stone and tubercle of the kidney is of sufficient importance to necessitate a separate chapter being devoted to each, whilst the cystoscope in renal carcinoma with pain and tumour—for the latter is generally present with the former—is not of much value.

CHAPTER XXII.

THE VISUAL CHANGES IN THE URETERIC ORIFICE AND ITS EFFLUX WHICH MAY BE CAUSED BY A RENAL CALCULUS.

FOR the sake of clearness of description it will be as well to divide this subject into three separate sections.

1. The aspect of the vesical orifice of the ureter of a kidney in the pelvis of which a stone is imprisoned.

2. The aspect of the orifice of the ureter along which a stone is descending.

3. The aspect of the orifice of the ureter in which a stone has become arrested in transit.

1. *The Ureteric Orifice in Imprisoned Pelvic Stone.*

When a stone, whether of the oxalate or urate type, has formed in the pelvis or some deep calyx of a kidney, it does not manifest its presence at first by any characteristic visual changes in the ureteric orifice. In a very few instances when the stone is small and crystalline surfaced, no other symptom may be present beyond an intermittent "symptomless" hæmaturia. No pain is felt by the patient as a guide to the organ affected, and in these instances the efflux of blood from the ureter is of course readily detected, and the site of the disease is as readily diagnosed. Such a kidney will frequently secrete very rapidly during the occurrence of the hæmorrhage, and the jets will issue from the orifice one after another in rapid succession—an activity which is probably characteristic of a reflexly irritated kidney. But beyond this intermittent hæmaturia and the hypersecretion when the bleeding is present, there is no

change in the contour or aspect of the ureteric orifice to mark the presence of a small crystalline surfaced stone imprisoned deep in the renal pelvis.

If, however, the stone does not find its way along the ureter, three groups of sequential changes may occur in process of time in the renal pelvis and gland tissue. These mark the three grades in the destructive effects of renal stone, and each grade *may possibly** cause an alteration in the contour and appearance of the corresponding ureteric orifice. Thus:

a. Dilatation of the renal pelvis by a calculus obstructing the outlet is sometimes accompanied by an apparent elongation of the corresponding ureteric orifice and by a congestion of its lips.

b. Calculous pyelitis of the alkaline type produces a characteristic scald-like erosion and blush of the ureteric orifice, a condition which may subsequently give place to cicatricial warping of the opening.

c. Entire cessation of the life of a kidney affected by calculous pyelitis is marked by "holing" of the orifice and a ureteric efflux of solid or semi-solid pus.

These three changes in the appearance of the orifice and in its efflux seem to me to be of so much importance in operative interference upon the kidney and in the diagnostic prognosis of the renal condition, that I venture to remark upon them in detail.

* I say *possibly*, for it is not by any means contended that the ureteric orifice *always* changes when a stone forms in the corresponding kidney. It is merely stated that such does occur in a fair proportion of cases, and that this proportion is large enough to warrant the cystoscopic examination, and the inferential suspicion that stone is present if such changes are found with other clinical symptoms of the disorder.

Instances in which no official changes existed.

1. (Miss E—, vol. v, 91.)—I removed a large branched aseptic phosphatic calculus from the left kidney. There was no pyelitis; neither ureteric orifice was abnormal.

2. (Mr. L—, vol. v, 94.)—An adherent oxalate in left pelvis; no ureteric change.

3. (Rev. P. E—, vol. v, 360.)—A soft, small, whitish oxalate in pelvis; no change.

A



B



C



Figs. B. and C.—Lime oxalate stone projecting from ureteric orifice. Seen sideways and from in front.

Bale & Danielsson, Ltd., L

- A. Dilatation of the Pelvis of the Kidney by Stone may produce an Apparent Elongation in the Ureteric Orifice by causing Venous Congestion of the Lips (cf. p. 350).

Cystoscopy.—The urine can generally be cleared by Contrexeville or Kronenquelle water, and the bladder, with the exception of a marked injection of the trigonal and post-trigonal vessels, will appear healthy.*

On contrasting the two ureteric orifices it will be noticed that the one which corresponds to the affected kidney appears elongated; the opening is no longer a tiny slit, but a furrow. The lips have not the slight pink blush of health, but are of a colour duller and darker than that marking the buccal mucous membrane. They are, moreover, swollen (Plate XXI, fig. A). The novice might conclude that this condition represents a dilated ureteric orifice, and argue therefrom that the entire ureter corresponds in size and colour-change to the opening. This is not so. If an ordinary ureteric catheter is passed into such a ureteric orifice through an open tube by Kelly's method, it will fit the orifice snugly, and demonstrate that the lips alone are changed by congestion, and that the vesical part of the ureter is not dilated. This is, of course, presuming that no calculus has travelled along the tube.† Moreover, if in a case of elongated ureteric orifice the ureter be exposed in the loin, lightly stripped of its fat, and examined by means of a strong head-lamp, but little change from its normal size, colour, or shape will be detected.

The rule is this: the lips of the ureteric orifice become passively congested and swollen with some interference of

* In three or four of my cases that curious and rare adenoid-like appearance was met with. I have previously remarked upon this condition (p. 118), and surmised that it may be evoked by irritation of the urine, but it is neither characteristic nor common.

† If a calculus has travelled along the tube the orifice may be stretched, and very frequently looks larger.

the ureteric venous supply.* Hence the *apparent* elongation of the orifice itself.

The extent to which the furrow of the orifice is elongated is no index to the degree of dilatation of the renal pelvis. That is to say, a very elongated orifice does not necessarily indicate marked hydronephrosis or hydro-ureter.

It will be observed there is no assumption of diagnosis here as to the *cause* of the dilatation of the renal pelvis, for this condition of the orifice is seen in various obstructive diseases of the ureter, bladder, and urethra. The presence of calculus must be established on clinical and radiographic grounds, but it gives us a clue to the side on which trouble exists if the stone be latent, and an idea of the commencing dilatation of the pelvis if stone is known to be there.

If, now, renal pain suggestive of calculus be complained of, and a marked elongation of the ureteric orifice be noted on the same side, we have good reason to advise renal exploration, even though the urine be clear and other symptoms of stone be absent, for dilatation of the pelvis is usually the first step in the series of destructive changes which are set up by the presence of stone in the renal pelvis. It should therefore be a distinct indication (prophylactic) for the removal of the offending body.

The following obscure case was under the care of Mr. Gilford, of Reading, to whom I am indebted for a very accurate history :

A little boy, R. M—, æt. 7½, with a family history of phthisis—the mother had been operated on for a tuberculous tumour of the breast (Targett), and an uncle had recently died of joint tuberculosis—began to pass blood with his urine. On two or three occasions the blood was sufficient in quantity to give a reddish

* Where the exact interruption is I cannot say. It may be in the course of the ureter, and often is so, I believe, in females, but as it most frequently accompanies disease or dilatation of the renal pelvis, I look upon the congestion as analogous in its multi-causation to rectal piles.

colour to the urine, but as a rule it was scanty, and could only be detected by aid of the microscope. No other symptom was noticed. Gradually, quantities of granular *débris* mixed with pus and blood appeared in the secretion, and tubercle bacilli were reported to have been found. On these grounds, and because of his wasted appearance and his family history, the case was suspected to be

FIG. 133.



Skiagram of stones removed from patient E. L.—. Note varying densities.

tuberculosis, but no subjective symptom enabled the disease to be located. The diagnosis of tuberculosis was confirmed by a well-known hospital physician in London.

After eighteen months I was asked to cystoscope the bladder in order to ascertain the source of the symptomless pyuria. I found the bladder healthy and free from tubercle. The right ureteric

orifice was elongated and congested; no efflux was noticed. The left was healthy. I diagnosed latent stone in the right kidney. Radiography showed four stones in the right kidney (Plate XXII). I removed four (Fig. 133). The kidney was free from tubercle. It was hollowed, and the pelvis was dilated. The point of the largest stone had dropped like a nose on to the pelvic orifice of the ureter, and had induced dilatation. The boy recovered, and has been well since.

Now there was nothing in this case to locate the kidney as the cause of the pyuria except the cystoscope.

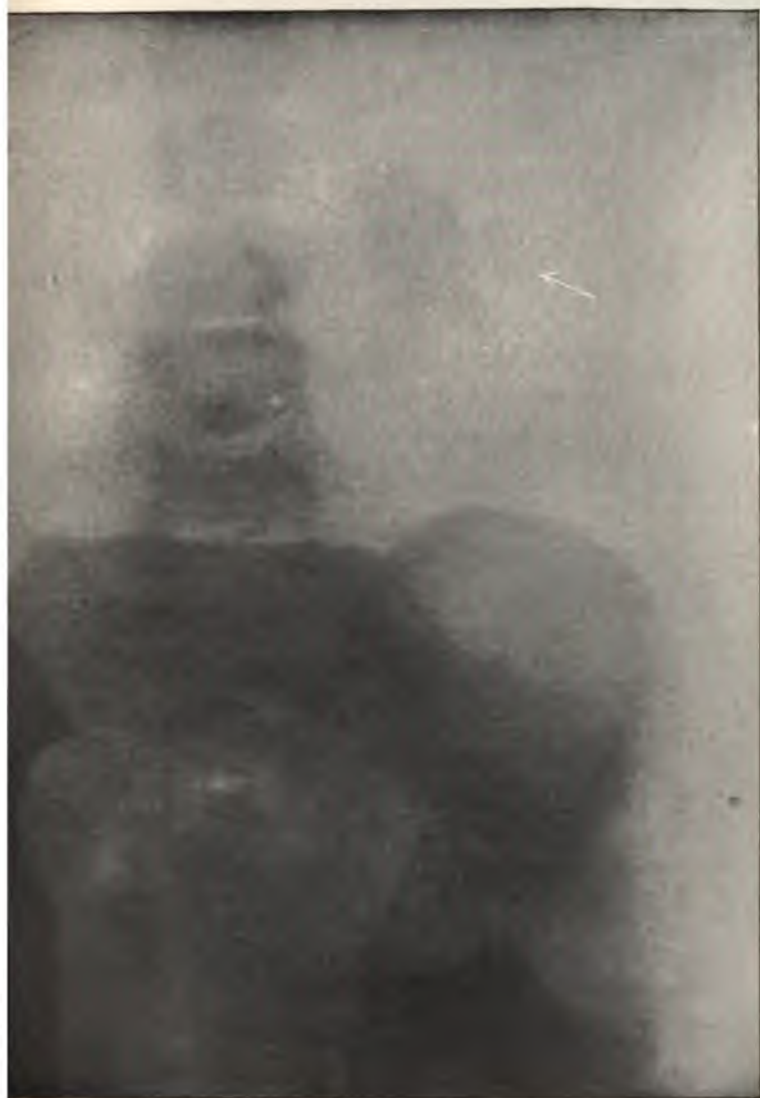
It might be argued that the radiography demonstrated the stones. True, but radiography is not yet infallible. Here is a case in point:

G. K—, a boy *æt.* 12, a patient sent by Dr. MacMunn, had been noticed to be passing puriform urine painlessly. No evidence could be obtained of the source of the pus. He was sent to me for diagnosis. No tubercle could be found in the urine. Two radiographs of the kidney were taken but without result, and yet the boy was thin, and apparently a capital subject for the X ray.

On cystoscopy I saw the left ureteric orifice was decidedly abnormal; it was more open than natural. The lips formed an oval which was bridged by a central adhesion. There was no efflux, but pressure on the loin caused the orifice to gape. The left ureteric area of the bladder was distinctly granular and spongy. The other ureteric orifice was healthy, and so was the rest of the bladder. Although the left renal region was not tender, and no tumour could be discovered, yet, relying on the cystoscopy, I cut on to the left kidney and found the pelvis dilated, the kidney much atrophied, and an adherent, smooth oxalate stone, the size of a big cherry-stone, lay at the pelvic orifice of the ureter. The boy recovered.

- B. Chronic Calculous Pyelitis (of the Neutral or Alkaline Type) produces a Swelling and a Scald-like Erosion of the Ureteric Lips, and a Reddening of the Immediate Area around.

The stage in which the imprisoned calculus induces alkaline pyelitis is generally characterised by marked changes in the orifice of the corresponding ureter, changes which are manifestly due to the passage over them of caustic puriform urine. This alteration is some index to



Skiagram of stones in the kidney of a boy. Removal and recovery.

an exceedingly thin layer of mucus, like candle-wax. The urethral orifice of the bladder is swollen, gelatinous, and translucent.

All these basal changes point to the irritation of pyelitic urine diffused over the lowest area of the bladder, not concentrated, as it is upon the lips of the affected ureteric orifice. The cystoscopist will find these changes are often related, clinically, to bladder irritability and scalding on urination.

Mr. H—, æt. 40, sent by Mr. Braine. Maternal history of phthisis. Patient has had fixed pain in left kidney for twelve years. He has had exacerbations four times a year, but is not sick with the attack. Lying on the left side relieves absolutely; cannot lie on right. No frequency of urination; no pain in connection with micturition.

Urine 1014, pyelitic, acid. A left renal swelling detected in left loin.

Cystoscopy.—Left ureteric orifice large, lips much swollen; orifice a crenated hole, lower edge slightly ulcerated. From this opening an occasional stream of puriform urine issues. Base of bladder and right ureteric orifice a little swollen.

Diagnosis.—Dilated left renal pelvis. Left pyelitis. Incarcerated calculus in left kidney.

Operation.—The left kidney was large. It was sacculated and contained much pus, and in the pelvis was a large, fixed, branched stone. It was removed. The patient healed, and reported later on as well.

I may here digress in order to add that in one case of nephropexy I unwittingly induced all these appearances by setting up a descending ureteritis.

A girl, æt. 20, was brought to me with a tender movable left kidney. I stitched it up with two catgut strands in the usual way. The patient passed blood during her convalescence, and complained of much kidney pain. I sent her to the sea-side, but she returned passing pus, blood, and phosphatic material in her urine, and complaining of much bladder distress.

I examined with the cystoscope, and saw the left ureteric orifice buried in a pink gelatinous mound of œdematous mucous membrane. The surface of this mound was superficially eroded, and from the orifice hung a thick tape of muco-pus. Behind this again,

on the bladder wall, was a distinctly ulcerated surface the size of a lentil. Was this a stone descending, or was it pyelitis? I cut down upon the kidney and found that one of my ligatures (catgut), which I had used to anchor the kidney, had been inadvertently passed through one of the lower calyces of the kidney. The irritation of this non-absorbed ligature had induced descending pyelitis. I cut the strand and pulled it out. Nothing more was done. All the symptoms of bladder distress and of renal pain disappeared, and the urine became normal.

(b) *A Severer Grade.*—As the grade of the pyelitis increases in severity the secretion of the kidney diminishes; it becomes more alkaline or even septic, and of a fishy smell, and the ureteric orifice suffers more acutely in consequence.

The ureteric lips thicken, become more eroded, or ulcerated. They may even be rolled out by ureteric spasm, and resemble in miniature the everted anus of a horse during defæcation. A slow trickle or a small forceless stream of muddy urine issues sluggishly from the orifice, an effort which may not be repeated for many seconds, but the opposite kidney is now active, and repeated streams of glycerine-like urine issue from the opposite healthy ureteric mouth.

That part of the interureteric bar upon which the diseased ureteric orifice opens becomes upraised (? hypertrophy from repeated spasmodic efforts). The mucous membrane covering it is patched with small deep red extravasations, or the whole ureteric area may acquire the aspect of eczema rubrum.

In a few instances small grape-like bodies (distended glands) appear in clumps in front and at the side of the orifice. This condition, I believe, serves to indicate the extent to which the pyelo-nephritis has crippled the renal tissue.

The trigone is more congested, more swollen, and more gelatinous than in the milder grade.

Mrs. X. L.—, a patient of Mr. H. R. Townsend and Dr. P. T. Cremen, of Cork. In September, 1900, this lady had a sudden

and apparently causeless attack of fever, accompanied by pain inside the anterior superior iliac spine of the right side, and pus appeared in the urine. It subsided, but she had rigors at Christmas, accompanied by pain and difficulty in urination. A succession of rises of temperature ensued, each rise being heralded by the urine becoming clear, the temperature falling when pus reappeared.

The irritability of the bladder varied with the pus, being most marked when the pus was abundant. Urine, sp. gr. 1006.

It was elicited in cross-examination that she had suffered from pain in the right loin and over the appendix twelve years ago, but latterly had not noticed any pain in these regions. No tenderness or swelling found on palpating right renal area. The diagnosis I received was "calculous pyelitis."

Cystoscopy.—Greater part of bladder healthy. The orifice of right ureter elongated and lips swollen. Lower lip so denuded of epithelium as almost to amount to an ulcer. A forceless tricklet of muddy urine issued from orifice. Right limb of interureteric bar thickened. Right ureteric area patched with extravasations. The left ureteric orifice healthy and small, although the lips were a little puffy, participating in the swelling of the base. Trigone and urethral orifice much reddened and swollen.

Diagnosis given.—1. Dilated pelvis. 2. Stone in inflamed right renal pelvis. Descending puriform urine eroding lower lip of right ureteric orifice, causing hypertrophy (?) of bar and patched extravasation of ureteric area. 3. Right kidney secreting indifferently.

Operation.—Fatty capsule of kidney very adherent. Kidney white in parts; pelvis dilated. A pure oxalate of lime stone of a triangular shape filled the pelvic cavity, and the projecting nose occupied the pelvic orifice of the ureter. Patient recovered.

I was asked by a colleague to cystoscope a thin, cadaverous-looking male patient, æt. 45. A large tumour was felt in the left renal region. There was much frequency of micturition, the act being accompanied by pain. No genital tubercle.

There was a history that he had had intermittent hæmaturia from boy to manhood. Urine neutral or alkaline, 1018—1020. Pus, no tubercle bacilli.

Cystoscopy.—Bladder dark (light-absorption due to epithelial change). Left ureteric orifice everted like a horse's anus. The everted mucous membrane was ulcerated. Patched extravasation in left ureteric area. Small cyst-like bodies singly and in groups to the outer side of orifice. Right ureteric orifice healthy.

Operation.—Mr. Openshaw cut into the kidney, which was a thin-walled sac. A quarry of rough phosphatic stones found and removed. One large black eroded stone lay in the pelvis over the pelvic mouth of the ureter. Patient recovered.

(c) *The Severest Grade.*—As time progresses the grade of the pyelitis becomes increasingly severe, and the severest form finds, I believe, its best illustration in women, and especially in those who have a family history of tuberculosis. The irritative action of the descending acrid puriform urine is no longer confined to the ureteric orifice of the stone-bearing kidney; it affects the entire bladder. The coats of the viscus become deeply inflamed, they then thicken, and finally contract. The capacity is therefore ultimately much diminished, and though the stone may be removed from the kidney, and even the kidney excised, yet the recovery of the bladder is tardy and sometimes never attained.

Cystoscopy.—The lips of the affected ureteric orifice are dark red and ulcerated. The orifice is wide and gaping, the area around much reddened and swollen; the mucous membrane of the entire bladder is, moreover, so altered as to assume the appearance of chronic contracting cystitis, marked by recurrent attacks of acute inflammation.

The efflux from the diseased ureter is slow, forceless, and thick; it is white, even yellowish in colour.

Mrs. P—, æt. 32, came under my care at St. Peter's Hospital, suffering from extreme pain and irritability of the bladder. Her history was as follows:

From childhood until three years ago she has had occasional severe pain in her right loin. This pain came on suddenly, lasted a few hours, and was accompanied by vomiting. There was never any hæmaturia.

Three years ago the urine became thick (pus), and the pain in the right kidney subsided, and has since nearly disappeared.

Her chief complaint now is that day and night she has to pass urine every twenty to thirty minutes. There is much scalding, great difficulty and straining in the act. Urine 1010, acid. No casts, no tubercle bacilli, but pus. There is a family history of phthisis and kidney disease.

Cystoscopy.—The right ureteric orifice was widely open, and I could have thrust a lead pencil into it, but it was smooth and non-infiltrated. The area around was much swollen and ulcerated, and of a bright red, like the peeled and peeling patches of eczema rubrum. The left ureteric orifice was also patent and "holed," half the size of the right. The trigone and the base of bladder were greatly inflamed and ulcerated in one part. The rest of the bladder was much congested and thickened, and it held with difficulty two or three ounces of medium.

Extract from notes.—"I thought there might be stone in the right kidney, but that it was much diseased as well, also that the left kidney had commenced to give way, and I did not therefore care to interfere if I could not nephrectomise. I was much biased by the family history of tuberculosis."

She was much improved by her stay in the hospital, and the pus diminished greatly. Feeling sure I had erred, I kept in touch with the patient through the courtesy of her doctor, Mr. Garneys Wales of Downham Market. He had always expressed his belief that stone existed, and that something might be done to relieve the patient.

After two years she came temporarily under the care of Dr. Powell, of Brighton, who X-rayed her, and said the right kidney could be operated on. The patient returned to me. Her sufferings were extreme. Every few minutes she strained to relieve herself of urine, every act being accompanied by severe meatal and perineal pain. On examining with the cystoscope I found the ureteric orifice had exactly the same appearance as when seen two years ago, but I now recognised in it a condition which I had since become familiar with, as typical of severe calculous pyelitis with consecutive ulcerative cystitis. I therefore performed nephrolithotomy in the hopes that the removal of the stone would cure the bladder pain.

I removed a large branched uric acid calculus from the right kidney. The wound in the loin quickly healed, but her symptoms were not much ameliorated. The right ureteric orifice was round and patulous, but pus oozed from it in plugs. I therefore performed right nephrectomy, after satisfying myself that only pus came from the right renal pelvis. Even this did not cure her, though her pain was certainly abated, but it will be seen from her letter lately received that her sufferings are still great. "Sharp pain is decidedly better, but the frequency is no better yet. I cannot retain my urine any longer than a quarter of an hour, and then I have a lot of that smarting and burning pain while passing urine. . . . When I get a bit tired this other kidney aches a good bit, otherwise I feel better

in my general health, and keep about all day, but I do only very light work. If I could but get the bladder stronger and the frequency better, I could bear the pain, as it's not nearly so intense as it used to be, but the frequency is just as bad at night as during the day, and so I get no proper rest with it."

Clinical.—The severer forms of calculous pyelitis are, I believe, always accompanied by bladder suffering, the acuteness of which will depend on the duration and grade of the pyelitis, but the essential cause lies in the condition of the vesical orifice of the ureter. In the severer forms marked frequency of micturition (diurnal and nocturnal) will be complained of, and scalding and pain will be experienced in the urethra during and after the act. The actual suffering varies according to the decomposition of the urine. In rare instances women suffer pain at the upper part of corresponding buttock. Blood is only seen after exercise or severe exertion, and this will emanate from the kidney.

It is interesting to note that the vesical irritability is affected in some cases of ulcerated ureteric orifice by posture in sleep. If the patient lies on the *affected* side, the irritability of the bladder at night is much more marked. In fact, I look upon this sign as characteristic of an ulcerated orifice, or a rawness in the circumureteric area (cf. page 210).

It is also noticeable that as the pyelitis increases, and the bladder symptoms become more pronounced, the renal pain, which has been so long a feature of the case, subsides, and may even be *forgotten*. This latter fact is very misleading, for a practitioner summoned to the case in what may be termed the bladder stage, has his attention more especially drawn to the vesical distress, and neglects to ask for a history of loin pain.

One word as regards sex. Women undoubtedly suffer more frequently and more severely from large renal calculi. Some compensation, however, lies in the fact that they are more easily and surely radiographed, and much more easily operated upon, for renal surgery in

women hardly ever presents any operative difficulty worth the mention.

An Especial Difficulty.—An especial difficulty occurs in women in deciding between advanced calculous pyelitis and *very chronic* reno-vesical tuberculosis.

There is much similarity between the clinical symptoms and cystoscopic features of these diseases. Both cause diurnal and nocturnal bladder distress. In both there may be renal swelling and evening temperature. Both affect the ureteric orifice and surrounding bladder surface in much the same way.

There are a few points which may serve, however, to distinguish them. There is usually a long history (years) of renal pain with renal calculus and years of pus-free urine, and the bladder distress usually comes on after the appearance of the pus in the urine. The renal pain in tuberculosis is of shorter duration (one to two years), the bladder being implicated early. The urine is nearly always puriform in tuberculosis from the onset, and frequently tubercle bacilli are discovered in it. Unfortunately the bacteriological research may be negative in tubercle and radiography negative in stone, so that it is important to attempt a cystoscopic differentiation.

The cystoscopic points which I rely upon are the following :—The ureteric orifice in calculous pyelitis is not a thick-edged, sharply cut hole as in tubercle. I have never seen it dragged out of its position in the trigone, as in tubercle. Both ureteric orifices are never patched in calculous pyelitis with extravasations as they are in tubercle. The entire surface of the bladder in calculous pyelitis never shows the extensive red-edged surface ulcerations with healthy white intervening areas, nor the pinched-up, rose-red, granulation-covered patches, as it does in tubercle. I allude to this subject later, page 488.

In men with genital evidence of tuberculosis present of course, an easy differential diagnosis is to hand.

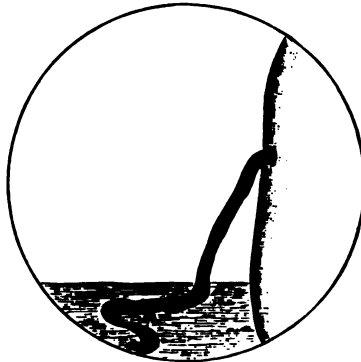
c. The Kidney becomes functionally Useless, the Stone being still imprisoned.

Sooner or later the pyelitic inflammation invades the parenchyma of the gland, and pyramid after pyramid becomes useless.

If the ureteric channel remains open the kidney becomes fixed, it is retracted upwards, and, in course of time, ceases its secretory work. Not infrequently the pain subsides in the kidney as *the organ becomes fixed*. Pain may even be unmentioned by the patient unless it is elicited by cross-examination, but the pus or muco-pus still appears in the urine.

On cystoscopy, the bladder having been thoroughly

FIG. 134.



Cystoscopic diagram of a "pipe" of soft putty-like pus being pressed from left ureter.

cleansed, one ureter will at once strike the observer as being abnormal. It is no longer a slit or a furrow, but a small round hole. The edge is not inflamed, it is sharply defined. Suddenly there will be seen to issue from it a flat, white tape of pus. This will come out quite slowly; it will slide down the slight incline, and coil on the post-trigonal area just like treacle dropped from a spoon (Fig. 134), or the pus may be stiffer in consistence. It will then issue solid, like a macaroni stick appears as it is

forced through the perforation of the macaroni machine. This will project for a certain length and then quietly break off; the segment will now slide down on to the bladder base to be replaced by another extruded length. The efflux soon ceases, and may not be repeated for a short time. Should the cystoscopist note the hole-like opening it should receive his patient scrutiny, for the pus may not then be issuing. The semi-solid or solid pus denotes that there is no urine, but that the pus, being secreted in the pelvis, is being forced along the ureter by the contraction of the tube. It is an indication that probably nothing short of *nephrectomy* will suffice, for the gland, if it be inflamed and functionless, is of no use to the patient, but is, in reality, a source of danger.

The macaroni efflux is not diagnostic of stone; it is merely an indication of old pyelitis with a functionless kidney, but it has an important bearing on operative procedure, for if the stone *only* is removed the suppurative pyelitis will continue, the loin sinus will close and open repeatedly, or remain discharging pus freely. In either case a nephrectomy will have to be carried out subsequently. What is needed, and that urgently, is a visual test of a functionless kidney. Can no method of staining be adopted whereby we can tell a functionless kidney when it is cut into? I am sure some at least, if not many, of the cases of long-continued calculous pyelitis in which we encounter thick, *large*, and hard kidneys which have harboured fixed, branched pelvic stones for many years are quite deficient of all renal power. The interstitial tissue is well nourished; they bleed on section; they inflame, and they give rise to severe pain when inflamed, but they are useless. It might be contended that the ureter catheter affords the best evidence of an active kidney, but I have found this method of research misleading.

Illustrations of Solid Pus Effluxes.

H. B. H—, æt. 60, was brought to me in 1897 by Mr. Stormont Murray. For twenty-two years patient had had pyuria of an

uncertain cause. Latterly he had been liable to recurrent attacks of fever with rigors. The history I obtained was—

In 1871 attacks of left renal colic.

In 1873 passed a left renal uratic calculus, but pain continued in left kidney.

In 1875 pyuria.

In 1878 a prostatic abscess was opened by the late Mr. John Wood, and the resultant perineal sinus leaked for ten years.

In 1881 pain ceased entirely in left kidney; no further symptoms except constant pyuria, no bladder irritability except with the fevers.

I was quite unable to say where the pus came from—whether from an old prostatic abscess sac or left-sided pyelitis.

I attempted to cystoscope, but met with difficulty at the prostate and desisted. Repeated rigors ensued. The left kidney suddenly became intensely painful and swollen. His general condition rapidly deteriorated. I cystoscoped again, and saw a small round open left ureter with solid pus issuing from it. I cut down upon the left kidney, found it hard and embedded in dense adhesions and tough fat, opened an abscess in the cortex, found a fixed pelvic stone and removed it. The pyuria at once lessened, but the loin sinus closed and reopened; feverish attacks ensued, and I nephrectomised with considerable difficulty. He healed, and is now in perfect health.

Case 2.—W. S.—, æt. 53, was sent to me by Surgeon-Major John Smythe, of Mysore, with the following note:—"Mr. S.— has suffered for five years from pyuria, and has been treated to death for cystitis. I came to be in charge of him recently, and finding the so-called cystitis painless and, indeed, presenting none of the symptoms of genuine cystitis, I examined him with the cystoscope, and saw the pus issuing from the left ureter and nothing coming from the right. The left kidney is, I think, slightly enlarged. In addition to the pyuria there is hæmaturia on exertion, such as after a game of rackets or a ten-mile walk. What the cause of the symptomless pyelitis is remains to be seen. I suggest stone. He has been twice radiographed negatively. I think the left kidney should be explored."

I ascertained that the patient had been operated on for stricture five years previously when on a visit to Ireland—that he could pass No. 12 E, that the pyuria was symptomless, but that there was a history of an occasional but slight pain lately in the left side; that he had slept latterly on the left side to ease the pain.

On cystoscopy the left ureteric orifice was tumid, prolapsed, and widely dilated. After watching it some seconds a continuous defæcation of a thick round column of white pus took place very slowly. The rest of the bladder was healthy, the right ureteric orifice but small and red.

On exploring the left kidney the perirenal fat was found much adherent, an abscess was opened in the cortex of the tail, and an irregular-shaped stone embedded at the end of a calyx in the tail was removed. I drained. The wound healed to a sinus, whence day by day for months thick pus issued, but no urine. I therefore removed the kidney. He has since been in perfect health.

An Especial Fallacy.—The cystoscopist must locate the ureteric ridge, and satisfy himself that he is watching the *ureteric orifice*, and not a sinus opening into the bladder. In women perivesical abscesses in connection with the ovary or other pelvic viscera occasionally burst into the bladder by small openings,* and thick pus is extruded in a macaroni or telegraph tape condition from the mouth of the sinus, exactly in the same way as that issuing from the ureteric orifice of a functionless kidney, the subject of chronic calculous pyelo-nephritis. *The cystoscopic difference is luckily well marked* when the kidney has become functionless, the wave of acid urine has ceased, the pus is often unirritating, and the circumureteric area is therefore comparatively flat, smooth, and healthy, only the orifice is rounded and patulous; but in those cases in which an abscess outside the bladder bursts into it the mucous membrane around the sinus is remarkable. It forms large, gelatinous, purple folds. These "fixed," congested, and œdematous rugæ are the result of the proximity of the extra-vesical inflammation. Between two of the most prominent rugæ the tape of pus issues. These artificial openings are mostly away from the ureteric area, being at the sides low down.

* Cf. cases adduced in the chapter on fistulous tracks leading into the bladder.

CHAPTER XXIII.

THE ASPECT OF THE ORIFICE OF A URETER ALONG WHICH A STONE IS SLOWLY DESCENDING.

MANY interesting clinical features are associated with the history of a small descending stone. As a student one is apt to consider that once a stone has started on the downward path it completes its journey quickly, often within a week or so. Increased clinical, cystoscopic, and X-ray experience demonstrates that many stones take months before they finally issue from the ureteric orifice into the bladder; that during this time the pain is not continuous in the kidney; as often as not the renal pain is only in the form of colics or "kidney attacks;" that when it has reached the lower third a fixed pain above Poupart's ligament is experienced which may be mistaken for quite a variety of diseases—appendical or ovarian, or even hernial trouble; and that, when it has entered the lower two inches of the ureter it may elicit all the clinical symptoms of stone in the bladder. Lastly, in many cases a cystoscopic examination may reveal the probable cause of the pain to be a stone which is too small to cast a shadow with the X rays.

My attention was drawn very forcibly to this subject by a mistake I made some years ago in cystoscopic diagnosis. I had inferred that a certain appearance was always associated with descending tuberculosis and not stone. The case, though prolix, is well worth quoting in detail. It will also serve to introduce the subject.

A. L.—, æt. 24—no venereal—came to me in 1891 complaining of slight pain in the right lumbar region, which continued until conclusion of case.

to exercise.

June.—More blood in urine and pain in penis towards

August.—Pain in right side easier, but more pain towards glans as the act of micturition is completed. "that the urine is spasmodically shut off by the pain."

September.—Free from pain in right side, but a little pain in groin. He urinates every hour in the day and night. The stream is often suddenly stopped by the urethra. He has then to leave off and button up, as explained to him it is useless to strain (reflex stammer of urethræ). Urine 1020, clear, only a few pus flakes. No bacilli; no crystals.

1894, November.—Cystoscopy. Some spasm in deep introducing instrument. Bladder free. No stone. Ureter healthy; lips a little swollen; a number of punctiform hæmorrhages are in the immediate neighbourhood of No bright ecchymosis.

Diagnosis uncertain. Mother died of tuberculosis, and the possibility of bladder is suspicious of that disease.

Exploration of right kidney: organ not opened. Kidney perfectly healthy. Operation gave complete relief from but still pain at end of penis after urination.

1894, December.—Suddenly something gave way in immediately a better stream resulted. Penile pain, intense just before this happened, now subsided, and the pain of bladder at night diminished.

I cystoscoped again to discover the cause for the amelioration of the reflex symptoms, and the reasons for the spasmodic stream, the narrowness of stream, and for the vesical irritation. I saw a small crystalline renal calculus which had evidently entered the bladder from the ureter, for the crystals were stained, and there was none of that white lime powder

ureteric orifice, may cause petechial hæmorrhages around that opening ; secondly, that when this condition is seen other clinical symptoms accompany it, such as (1) frequency of urination, (2) penile pain after the act, (3) spasmodic obstruction to the flow, and (4) some spasmodic, deep urethral obstruction to the passage of an instrument ; and that these symptoms are mainly reflex, for they disappear

FIG. 135.



Bloody discoloration of the ureteric orifice induced by block in lower ureter. (Dickinson.)

directly the stone passes into the bladder, or even, as it sometimes appears, when it shifts its position in the lower ureter.

On searching the volumes of the Pathological Society for any corroborative hint of this condition, I came across the following instructive and convincing case related by

Dr. Bagshaw,* and more fully dealt with by Dr. Dickinson† in his invaluable treatise on urinary disease.

A man æt. 62 was seized with suppression of urine, which was proved on post-mortem to be due to blockage of the right ureter, the left kidney having been atrophic and useless for years.

"The infundibula, pelvis, and ureter of the right side were dilated, and contained some urine. The bladder, when laid open, was found empty, and the orifice of the right ureter was found to be entirely blocked up by a dark-coloured plug, slightly rough to the touch, but not hard, being partly broken down by pressure between the fingers.

"Under the mucous membrane of the bladder, surrounding the orifice of the ureter, there was a sanguineous discoloration, and in another part of the bladder enough blood had been extravasated to form a clot the size of a bean" (Fig. 135).

This case proved to me that any acute distension of the ureteric canal near the bladder can discolour the orifice and its surroundings. I had previously noticed in cases of carcinoma of the kidney, after the passage of large clots, accompanied by renal pain and colic, that petechial extravasation took place around the ureteric orifice, but did not understand the cause.

The following notes of the cystoscopy of descending calculi have been gathered from cases examined during the last six years, so that I can safely say that no visual error or mistake in technique has stultified the observations.

Cystoscopy of the visual appearances of the ureteric orifice which may be caused by a stone slowly traversing the lower third of the ureter.

It will be noticed that I expressly say that changes may occur in the contour and appearance of the ureteric orifice when the stone has advanced to near the vesical end

* 'Path. Trans.,' vol. xvi, 1865, p. 176.

† A fuller account may be found in Dickinson's 'Treatise on Renal Affections,' vol. iii, p. 965. I am indebted to Dr. Dickinson for permission to use the figure (Fig. 135).

of the ureter. My reasons for laying stress on this are that I have occasionally seen no change in the ureteric orifice.* I have no evidence of any change taking place when stones have been arrested in the upper or middle third of the ureter. Further visual experience may show that stones higher up the ureter affect the appearance of the orifice.

The appearance of stone at the vesical orifice of the ureter is heralded by the appearance of bright red punctiform extravasations in the immediate neighbourhood of that opening; moreover that side of the interureteric bar becomes thick and swollen. The mucous membrane then changes until it assumes a dull red velvety appearance speckled with fine brighter red spots, the entire surface reminding one of a patch of subacute gonorrhœal urethritis. Finally the orifice and the area immediately around it becomes of a uniform red from extravasated blood, and thus forms "a bruised ureteric orifice."

The rougher and more spiculated the stone, or the larger the stone, the more marked the extravasation. Perhaps to combine these two, "the greater the difficulty of transit, so much the more marked the extravasation around the orifice."

The following cases will illustrate these statements up to this point:

The late Dr. Leach asked me to cystoscope a gentleman æt. 36. In 1888 the patient had had a typical attack of right renal colic, which was so severe that opium failed to give relief. After some hours of suffering the pain suddenly left him, and he had no further trouble.

March, 1891.—Severe right renal pain, which gradually subsided. Two months later sudden severe pain, extending from point of penis to neck of bladder, coming on after passing water, and lasting several minutes. This continued for ten days; no blood,

* Mr. A— (vol. v, 403), with symptoms of right-sided descending stone; no evidence in the ureter, and yet he passed a small spiculated stone five weeks after the examination.

no frequency at first. Gradually an intense perineal pain after urination and a constant desire to urinate.

Cystoscopy (June 28th, 1891, three months after last attack of pain in side and one month after the onset of perineal pain, the renal pain having subsided).—The right ureteric orifice was large, the lips swollen. The adjacent mucous membrane was covered with six irregular hæmorrhages of a dark colour. The rest of the bladder was quite healthy and clear; no stone.

I did not understand these submucous hæmorrhages then, but I noted them.

In September, 1891, two and a half months after I had cystoscoped, he had a "dreadful attack of pain in the perineum, and passed an oxalate of lime stone, covered with sharp plates and powdered with some triple phosphate; that is, the stone took, at the lowest computation, six months to pass.

H. B—, æt. 35, sent by Dr. Thompson, of Newport, Isle of Wight. Fifteen months' right lumbar aching pain, with hæmaturia on exercise.

The right ureteric orifice a little thick-lipped and congested; petechiæ on bar in front. Passed calculus a few weeks later.

Cystoscopic Appearances (continued).—As the stone enters that final section of the ureter where the channel pierces the coats of the bladder the vascular disturbance increases, and the visual appearance changes.

A deep red uniform extravasation appears in the ureteric area, especially covering the outer limb of the trigone. This is frequently replaced by enormous œdema of the orifice, so that the ureteric orifice becomes unrecognisable, being replaced by a white mulberry-shaped mass of translucent œdema.*

Slowly the stone makes its way through this lane of œdema until its brown † nose can be seen deeply buried in a centre or side of a glistening translucent mass.

* A few months ago I had difficulty in restraining an operating surgeon, who had discovered this condition, from doing a supra-pubic cystotomy for the removal of a "polypus" of the bladder, a condition which it fairly well resembles.

† These stones, making transits of such long duration, are most frequently brown, being oxalate, and most often spiculated.

F. C—, æt. 56 (March 15th, 1902), came complaining that for three months he had had pain starting in the left inguinal region, and passing round to the left lumbar region above posterior superior spinous process of ilium. The pain comes on in attacks which last an hour or so, but he has always an ache in the left inguinal region. He has occasional frequency of urination and occasional pain at the end of the penis in passing water.

Nothing detected in the ureter or prostate by rectal examination. The urine was normal.

On cystoscopy (March 22nd, 1902) the left ureteric orifice was puffed up with œdema, so that it resembled a large wrinkled scald bleb. In the centre was a depression, and occupying this was the brownish point of a calculus.

April 22nd.—A pricking in perineum.

April 26th.—Sucked out a small irregular stone by means of the litholapaxy evacuator.

Cystoscopic Appearances (continued).—At this point the patient is generally certain, from his feelings, that the stone has dropped into his bladder, and he points to the symptoms of penile pain, frequency of urination, and difficulty in making a stream in corroboration. If the stone becomes arrested for long in the vesical section of the ureter, the œdema subsides to some extent, the puffy ureteric frill of œdema loses its white glisten, assumes a dull ruddy-brown colour, the nose of the stone becomes white from deposited phosphates, and localised cystitis appears in the immediate neighbourhood of the ureteric orifice. The bladder then assumes the appearance of subacute cystitis, but these changes are always localised to the affected ureteric area.

It would appear easy to feel the stone at this stage through the rectal wall; it depends on the size of the calculus. Personally I have found the greatest difficulty in feeling a small ureteric stone from the rectum *once it can be seen from the bladder*,—that is, when it has passed between the coats of the bladder; nor can it be detected, unless of some size, when the sound is placed in the bladder, the beak turned over and firmly held against the ureteric orifice, and the finger introduced into the rectum to make counter-pressure.

Of course, if the stone is half the size of a date stone a distinct hardness can be thus detected, but this size is rare ; usually the calculus is a merely irregular collection

FIG. 136.



General size of many of the crystalline descending oxalate stones, which I have watched clinically and cystoscopically.

of sharp cutting crystals (Fig. 136), and the X ray is valueless when the concretion is so small.

The reader will note that only descending stones are now under consideration ; the arrested stones are larger ; they can generally be felt, whilst the X ray, used scientifically, can demonstrate them to perfection. Compare Chapter XXIV on arrested stones.

Three cases will serve to illustrate more clearly this condition, but I have watched over a dozen.

Case 1.—I was asked by Dr. Tait, of Highbury, to see a patient with renal colic.

Three weeks prior to my visit he had a severe attack of right renal colic. In five days the pain in the right kidney gradually subsided, but it was replaced by pain in the penis,* especially after urination, by spasmodic interruption in the act, and by frequency.

The patient, who had passed calculi before, was certain that a

* He described it as follows :—" Suddenly in the night of the sixth day I was awakened by a stinging pain in the penis and a pressing desire to make water. From previous experience I thought I was about to pass the stone, but was disappointed. The stinging pain remained and kept me awake for an hour. The same pain recurred the next day, always when passing water, and remained for considerable but variable lengths of time after. It, in fact, lasted for sixteen days, until relieved by operation. It was modified to a great extent, I think, by medicine, and varied in proportion to the quantity I drank. The irritation was very troublesome, especially if I drank much and had to urinate frequently. The pain always appeared to run along the tip of the penis, not underneath, and was most acute towards the end. What pain I had in the kidney was only slight, and I always considered them ' after-pains ' of the severe attack of suffering which I had had in this region."

stone had entered the bladder from the right ureter, and that it had caught somewhere in the prostatic urethra. From his symptoms I felt sure it had not yet entered the bladder from the ureter, and obtained leave to cystoscope rather than to use the aspirator.

On cystoscopy, a sharply defined brown oxalate of lime calculus, in the form of a spike, could be seen protruding from the mouth of the right ureter (Pl. XXI, p. 451).

The adjoining trigone was much swollen and very red. Examination by the rectum revealed nothing. Massage over the vesical ureter did not avail. I was puzzled to understand why this sharp-pointed body should retain its position so tenaciously.

I now introduced a lithotripsy evacuator, passed the eye over the stone, steadied the orifice by means of a finger in the rectum, and scooped the stone, with gentle pressure from the exhausting ball, from its bed.

On examining it the reason for its arrest was obvious. It was shaped like an arrow-head, and the shaft had been presenting, so that the barb had caught in the mucous membrane of the channel and fixed the stone.

Case 2.—A man æt. 27 had had right lumbar pain for six months, pain at the end of the penis, and frequency of micturition, the latter symptom being aggravated by exercise and relieved by rest.

Cystoscopy.—Bladder healthy, except the right ureteric orifice, the mucous membrane of which protruded, tumid, gelatinous, and red, like the anus of a defæcating horse. The ring of reddened membrane was almost obscured at its inner side by a mass of clear œdema. Deeply buried towards one side could be detected the brown nose of an oxalate calculus, which could be felt rectally. Even when supra-pubic had been performed, and the finger had been introduced, it was difficult to enucleate the stone from its ureteric bed. It was the size of a flattened pea with a projecting shoulder. The shoulder must have been the obstacle to the transit.

Case 3.—A patient who asserted he had been troubled with vesical stone for twenty-eight years—he had been cut for stone four times, and had stone crushed twice—applied to me saying he had had an attack of left renal colic, and he had felt the stone pass "plumb into his bladder." This was three weeks ago. At the same time the urine suddenly stopped in the middle of urination, pain was experienced at the end of the penis at the close of the act, which took place every hour in the day but not at night.

Cystoscopy.—A crenated, thickened left ureteric orifice, no efflux. Two thick folds of mucous membrane embraced it; between these hung out a milk-white slough of surface epithelium and a piece of white phosphate of lime; no stone felt *per rectum* in the lower ureter.

Diagnosis.—Stone arrested at ureteric orifice.

In *nine months'* time a small phosphatic stone came through, and was crushed and evacuated.

Ureteric Orifice after the Transit of a Stone.—If the examination is made soon after a stone has entered the bladder after a prolonged stay in the lower ureter, marks of its having been forced through the opening are apparent, and, I may add, characteristic. But the changes vary, if I may dogmatise, upon the size and character of the surface of the stone. If it be a fair size—an orange pip is a fair size—and circular, the lip of the ureteric opening is raised into an œdematous wavy frill, the opening is large, or the edge may be eroded, irregular in shape, and even sloughy, whilst the circumureteric area is vivid red, or the surgeon may be called when the acuter stage is subsiding, and then the edge will be found everted and gelatinous like a penile meatus affected by gonorrhœa. But if a smooth stone has come through, the ureteric orifice is enlarged and open, and it looks toneless and patulous; it is not much reddened, and the former change can be noted for some weeks, but it is quickly recovered from, and often when examining a month or two after the passage of a renal calculus into the bladder I have found it impossible on mere visual grounds to say along which ureter the stone has come. Indeed, in some instances a few days after an attack of severe renal colic all signs of disturbance had vanished, and I could not honestly say on cystoscopy through which orifice the stone had come.

CHAPTER XXIV.

THE CHANGES PRODUCED IN THE APPEARANCE OF THE ORIFICE OF THE URETER BY STONES PERMANENTLY ARRESTED IN THE LOWER THIRD OF THE URETER, AND THE CLINICAL FEATURES OF THE CONDITION.

I BELIEVE that there are few subjects in urinary pathology and surgery so little understood as stone impacted in the lower ureter, and yet few surgical conditions are so important, for few may prove so obscure, whilst none are able to entail such years of prolonged and apparently unrelievable suffering.

A renal calculus impacted permanently anywhere in the upper two thirds of the ureter has, it is true, a greater destructive influence upon the kidney, and can induce greater renal suffering than a stone impacted in the lower third; but such renal pain is slight, I venture to say, in comparison with that long-drawn-out agony which is caused by a stone impacted in the ureter near the bladder—for there is, in this situation, a greater tendency to periureteritis and inflammatory extension to the great pelvic plexuses.

In the last three or four years the obscurity of lower ureteric stone has been considerably diminished. Skilled radiography and expert cystoscopy have enabled surgeons to detect the arrested calculi, so that this complication will now gradually acquire clear and classical description.

The following chapter is a slight contribution to the cystoscopy of the condition, and I wish to lay particular stress on the fact that I am only now discussing stones

arrested permanently in the *lower third of the tube*. It may be because my material is insufficient that I have not, hitherto, met with orificial changes co-existing with impaction higher up.* I gather that definite changes of the mucous membrane of the orifice of the ureter ensue consequent upon the presence of a stone arrested in the ureter *near the bladder*, and that only a certain proportion of cases are thus affected.

Description of visual changes.—The changes relate to alteration in the shape of the orifice, and in the appearance of the mucous membrane lining it.

The former consists in protrusion and eversion of the mucous membrane of the ureter—prolapsed—strained out, so to speak, by the ureteric effort to rid itself of a constant source of reflex spasm—the obstructing body.

It has appeared to me that this tendency to prolapse is more marked when the surface of the stone is acicular or rough, but much stress need not be laid upon the surmise. Moreover the mucous glands, in or near the orifice, may be so distended with secretion as to resemble round or pyriform tumours of minute size. Often the appearance is like a bunch of small white currants.

In some cases (? rare) the prolapsed mucous membrane is covered with a low growth of villous processes, either in

* *General type of arrest of a stone about one inch below the kidney.*—Mrs. F—, cystoscopy, March 3rd, 1900. Left ureteric orifice healthy, pumping streams of darkish bloody urine. From the rapid recurrence and strength of the jet I anticipate a healthy kidney, without much loss of renal substance.

Operation, March 9th, 1900.—Kidney large and healthy. Large phosphatic covered stone about an inch below renal pelvis; longitudinal incision; removal. Ureter above, free from stone; rapid healing.

General type of arrest at pelvic brim.—Mrs. S—.

Cystoscopy.—Left ureteric orifice displaced a little backwards and upwards, appearing as a simple sharp-edged hole, but there is nothing characteristic: from it a decolourised blood-clot emerged with a fine tricklet of urine.

Operation.—Two stones removed from pelvic brim; cure.

the form of a tuft or in a continuous ring. From my experience of this growth I am certain it is the outcome of severe irritation, often that of oxaluria, occurring in a person disposed to warty formation of the skin (cf. page 260).

In other cases, instead of a benign papillomatous outcrop, there is much œdema of the ruchings of the edge of the prolapse—an exudation which simulates the appearance of broad-leaved papilloma, but essentially differs from it in character, and therefore in prognosis.

To sum up: the ureteric orifice, in certain cases of rough renal stone arrested in the lower third of the ureter, will appear either as a cone of œdematous mucous membrane, the orifice being at one side, rarely near the summit, the lips of the orifice being roughened, everted, often cleft, or as an everted prolapse of red mucous membrane—a condition which is more likely to be noticed when a small stone is caught and retained fast within the orifice of the ureter. In very chronic conditions a tuft of villous processes may be seen in the prolapse or on the swollen lips of the ureteric orifice.

*Type of Arrest below the Pelvic Brim, Two Inches from Bladder ;
with Changes (the Characteristic Type).*

Fluted oxalate stone, $\frac{1}{4}$ oz. in weight, situated in lower ureter ; no colics ; removal through perineum.—F. H—, æt. 18, was sent to me in March, 1895, by Dr. W. G. Little, of Nelson, Lancashire. The patient complained chiefly of pain in the glans penis after micturition, and occasional pains across the back. The onset symptom seems to have been the passage of blood at the end of micturition. This was eighteen months ago. The hæmaturia had recurred off and on since. There had been no venereal disease. The stream was fair; there was no frequency. The urine was 1012 in specific gravity, and contained a trace of albumen. The trouble had been variously diagnosed, the latest opinion being tuberculosis. There was no gross evidence of this disease, and the prostate was healthy and plump.

On electric cystoscopy I discovered a prolapse of the right ureter. Crowning the everted mucous membrane was a villous papilloma-

tous tuft. It flashed across my mind that the villous papilloma played some part in the production of the prolapse, just as piles tend to evert the mucous membrane of rectum, or polypus or growth in the gut sometimes induces intussusception. I therefore did supra-pubic cystotomy, and removed the prolapse and villous growth through a small caisson. On thinking over this case the same night, it suddenly struck me that the prolapse must have been due to irritation higher up the ureteric canal, for I had noted this condition in some few cases of renal calculus. I therefore returned to the patient, and passed my finger high up into the bowel. High up in the right ureter I just felt a stone the size of a

FIG. 137.

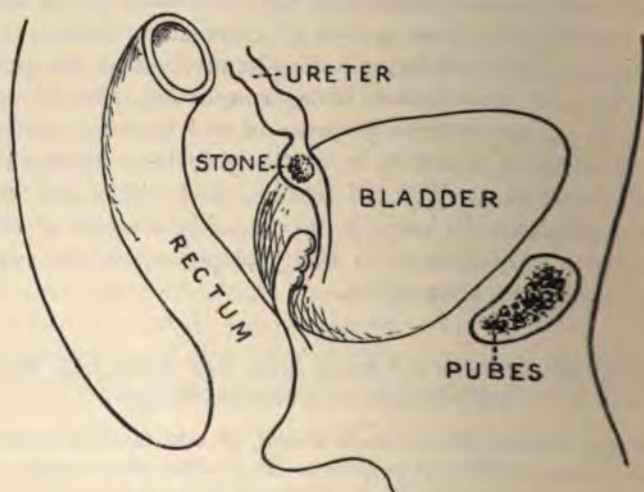


Diagram of stone in the right lower ureter of F. H—.

large marble. It had evidently become lodged in the ureter (Fig. 137), and had, as evidently, induced the prolapse of the mucous membrane at its orifice.

After the supra-pubic incision had healed, I approached the stone through a small transverse perineal incision. I had no hesitation in adopting this route, for it had been familiar to me for years in resecting pieces of vesiculæ seminales, in scooping out tubercle from the prostate, in splitting prostate capsules, in stitching vesico-rectal fistulæ, and such like operations between the gut and the bladder. With the aid of narrow, long-tongued retractors I

was able to dissect between the rectum and the lower urinary tract, every step of the route being illuminated by a forehead search-light, and by its means there was no difficulty in seeing and seizing up every bleeding vessel. I rapidly reached the ureter, being guided to it by feeling the stone in it (forced within reach of my finger by the pressure of the dresser's hand upon the abdomen). A clean incision into its long axis released a quantity of clear urine, and the stone, which weighed $2\frac{1}{2}$ drachms, was removed. The latter resembled a small peach stone in size and appearance (Fig. 138). On inserting the finger into the ureter it was evident that the calculus had been lying in a dilatation of the canal, for

FIG. 138.



Oxalate stone in ureter of F. H.—, half size.

the calibre was here about an inch across. I passed a thick *windowless* drain-tube up towards the kidney, and stitched its lower end into the perineal wound, providing thus for an easy route from the ureter into the perineum. The lower end was subsequently fitted to a tube dipping under carbolic lotion.

Finally I drew off 15 oz. of clear urine, specific gravity 1012, from the bladder, thus demonstrating that the bladder had not been wounded. Next day 20 oz. had drained away by the perineal tube, and 25 oz. were removed by catheter from the bladder. Specific gravity of the latter was 1015. There was an uninterrupted recovery.

Seven days after the operation I removed the rubber-gummed tube, judging that the pelvic connective tissue had united in the duct sufficiently firmly to form an impermeable waterproof. The fluids leaked rapidly. It will, perhaps, be conceded that the deep fushings on the surface of the stone did not materially interrupt the passage of the urine; any such accumulation of urine in the renal pelvis and upper ureter was thus avoided, and renal colic was therefore not avoided.*

Report to this case.—On January 14th, 1881, six years later, this patient returned to me suffering from “spasmodic attacks of sudden pain in the left kidney (renal colic) at intervals of three or four months. Lately these attacks have been very severe. He always has pain in the end of his penis.”

Cystoscopy.—The right ureteric orifice, from which I had clipped the prolonged mucous membrane with its accompanying villous tuft, was a small, sharp-cut, healthy hole. My surprise may be imagined when I saw the left ureteric orifice to have assumed an appearance identical with that noticeable at the right ureteric orifice six years ago. The mucous membrane was everted, swollen, and fringed with a tuft of broad villous processes. I examined per rectum but could not feel any stone in the lower ureter. I did supra-pubic cystoscopy and clipped away the swollen rackings of the papillated left ureteric orifice. I now had the pelvis X-rayed, and a shadow of a calculus was seen high up the ureter, about two and a half inches from the bladder. I therefore cut into the perineum, dissected between the prostate, bladder, vesicles, and rectum as before, and reached the left ureter. I went up as high as the white line, but could not feel the stone. I therefore did an abdominal section, and felt the stone in the ureter, just below the point of crossing the brim of the pelvis, but it was fixed by perireteric exudation. Some distance above this the ureter was the size of a child's intestine, and the left kidney felt like a thin sac. I could not push or squeeze the stone either up or down. Finally my house surgeon, Mr. Spencer, grasped it between his finger and thumb and pressed it towards my perineal wound, whilst I cut on to it blindly. I was able, by this means, after two hours' hard labour, to enucleate the stone from its ureteric bed. It was half the size of the one I had removed previously from the right ureter. It was a crystalline oxalate of lime calculus.

September, 1903.—Patient shows himself and says he is in the best of health.

* The case thus far was published in the ‘Edinburgh Med. Journal,’ March, 1884.





Skiagram of bony pelvis of a young man, showing stones in both ureters
Operation. Death

The following case is still more striking, for it concerns a patient with stone in both ureters low down, and crippled septic kidneys.

P. S—, æt. 21, from whom, as a little boy, I had removed by perineal section an impacted, smooth, aseptic, uric acid stone, was brought to me in 1902 with the diagnosis of stone in the bladder. His urine contained a quarter pus, and was extremely fœtid. I did not sound him, but an X-ray photograph was taken, and long stones were found in both ureters (Plate XXIII, ss') and in the left kidney. He was suffering too acutely from pain in the left loin and bladder for me to refuse him the chance of operative relief, though the outlook was hopeless. I cystoscoped to see which ureter was the more blocked. The right ureteric orifice was patulous, the lips greatly swollen, and fringed with broad-leaved rufings of mucous membrane like papillomata. The left ureteric orifice was open and swollen, but not fringed. I therefore cut on the left kidney, and enucleated the largest branched kidney stone I have met with; its length was six inches, and it weighed $6\frac{1}{4}$ oz. I replaced the kidney, determining to attack the ureters later. The urine passed next day was 70 oz., and on the next 100 oz., but he became uræmic, and died on the eleventh day.

Autopsy revealed an elongated stone in either ureter three inches from the bladder. Neither was fixed by periureteritis. The right ureteric stone weighed 90 grs., and was $1\frac{1}{2}$ inches in length. The left ureteric stone was freer and smaller. It weighed 55 grs., and was $1\frac{1}{8}$ inches in length. The right kidney was hugely dilated; the pelvis was full of pus. The left kidney shell had healed, and the pelvis was comparatively dry. Why was the right ureteric orifice so characteristic and the left less so? I think because the pyelitis was so extreme on the right.

Here is another characteristic but easier case.

F. M—, æt. 30, was sent me with an X-ray diagnosis of stone in the bladder (Plate XXIV). I cystoscoped because the stone was long and its axis almost vertical, so that I felt certain it was ureteric. There was no stone in the bladder, and obviously the calculus was lodged in the ureter. The cystoscope showed a very characteristic left ureteric orifice. The opening was fringed like the end of the Fallopian tube in colour and shape. I opened the peritoneal cavity over the left rectal sheath, and inserting my fingers pressed the stone up along the ureter until I had brought it above the pelvic brim. I now cut extra-peritoneally as if for tying the

iliac artery, and when the hugely dilated ureter came into view I opened it longitudinally, evacuated a quantity of clear urine, put in forceps, and pulled out a large oval oxalate of lime stone (Fig. 139).

FIG. 139.



Case of F. M.—, stone in ureter; weight half an ounce (nat. size).

The ureteric incision was then stitched, and the extra-peritoneal wound closed except for a drain-tube. Finally the vertical intra-peritoneal incision was closed, and the patient made an uninterrupted recovery.

But large stones may be present in the lower ureter without inducing official changes.

Smooth stone, weighing $\frac{1}{2}$ oz., in lower ureter; severe colics; no change in the ureteric orifice; removal of stone through the vaginal wall; cure.—Mrs. M. H—, æt. 48, was sent to me by Dr. G. Sequeira as a case of calculus. This patient enjoyed perfect health until ten years ago, when she had a severe attack of right renal colic. For seven years this recurred at long intervals, but for the last three years they have been incessant and enfeebling. Between the severe colics, which supervened every week, there was constant pain in the right loin. She was forced to sleep on the left side. Frequency of micturition was every hour, day and night; the act was painless; more urine was passed at night. Latterly bouts of excessive thirst had been experienced. On palpating the lower ureter by vaginal and rectal route, as is my routine custom in renal cases, I found a stone in the right ureter the size of a small chestnut; it was placed to the right of the uterus, but was



Skiagram of an oxalate of limestone in ureter. Removed. Cure.
(Author's case.)



freely movable. There was no prolapse of the ureteric mucous membrane into the bladder. Cutting through the right wall of the vagina I dissected towards the ureter, and fixed it and its contained stone with a very small sharp hook, which I use for supra-pubic operations. I then incised and released the stone. A large quantity of clear urine followed its removal, thus demonstrating the back pressure which had been exercised on the upper ureter and pelvis of the kidney. The stone was smooth, in size like a large nutmeg; it weighed over $\frac{1}{2}$ oz. (Fig. 140). I treated this

FIG. 140.



Ureteric calculus, Mrs. M. H— (half size).

case in the same way as that of F. H—, p. 481, pushing one end of a thick windowless drain some way up the dilated ureter, and allowing the latter end to protrude from the vagina into carbolic lotion. She made a rapid recovery; no fistula followed.

*Note on the Strength of the Efflux of Urine from the
Ureteric Orifice in Arrested Ureteric Stone.*

Does a rapid, full jet of urine from the ureteric orifice preclude the question of impaction of a stone in the ureter below the pelvic brim?

I think that a full, rapidly repeated stream is an evidence that the lower third of the ureter is free; it

does not preclude an arrest above, either at the orifice of the renal pelvis or a few inches below that point; at least, I have not yet met with a case in which a stream existed with a stone blocked in the lower ureter. In all cases, however, I sound the ureter with either Kelly or a Caspar ureter catheter, and carefully examine the lower ureter bimanually and by radiography. Such a question so guardedly answered might seem unnecessary, but those who have much to do with ureteric stones will agree with me that they are often slightly pouches and that there is in most cases ample room for the passage of urine between the stone and the ureteric wall.

It should be a rule with the operating surgeon, in cases of apparently causeless bladder irritability or habitual retention of urine of the mid-adult, if stricture and spasm be excluded, to examine the lower ureter for stones by means of the cystoscope, and he should *never hesitate in such cases to insist upon skilled radiography of the lower ureters as well.*

CHAPTER XXV.

THE VISUAL CHANGES WHICH TAKE PLACE IN THE URETERIC ORIFICE IN THE COURSE OF URINARY TUBERCULOSIS.

I HAVE already touched briefly upon the subject of urinary tuberculosis, and do not propose to recapitulate, except as to the manner in which the disease affects directly or indirectly the ureteric orifice. In drawing attention to the visual changes which take place in these openings under the influence of tuberculosis, I shall endeavour to prove that cystoscopy should guide the surgeon very materially in deciding upon the character and extent of any operative treatment for the eradication of renal tuberculosis. I have always maintained, if evidence of genital tubercle is to hand, in the shape of knots in the epididymis, vas, prostate, or vesicle, that the cystoscope should not be employed routinely, or if used at all it should only be passed with extreme care and gentleness (page 138); but there is a class in which no genital deposit can be found, and only renal or reno-vesical symptoms are present. It is in these cases that much obscurity of diagnosis exists, and it is in such cases that the gentle and skilled use of the instrument is advocated.

As the subject of ureteric meatoscopy in tuberculosis is not at present noticed in the literature, I do not hesitate to treat it somewhat in detail. In compiling this chapter I have at my command carefully prepared notes of over 200 unequivocal cases, but the chance of visual inaccuracy in my earlier experience with the cystoscope was very great, so that I have rejected all but the last fifty cases.

In forty-four of these, taken at all periods in the life history of the disease, I have noticed distinct changes in the ureteric orifices and their neighbourhood. These changes were described in my notes, written immediately after each examination. On collating them it was at once evident, even if the impression had not grown *pari passu* with my knowledge, that certain appearances of the orifices recur with sufficient frequency to warrant the assumption that they are characteristic guides to the position and progress of the disease.

I propose to deal with these appearances, and to add those clinical inferences which I feel certain may be logically deduced from them. Briefly enumerated the changes fall into two groups, those which may, in the present state of our knowledge, be ascribed to descending and those to ascending changes.

The descending (from a renal source) :—(A) A golf-holed orifice. (B) A displaced orifice. (C) A choked orifice. (D) Massive œdema of the orifice.

A. The "Golf-hole" Ureteric Orifice in Urinary Tuberculosis.

The change most often noticeable (30 per cent.) was a peculiar "holing" of the ureteric orifice on one side. I have called it "golf holing," "rabbit holing," in my notes. When this alteration in the opening is accompanied by the evidence of tubercle in the mucous membrane of the bladder, and by the presence of tubercle bacilli in the urine, it indicates, I believe, a deposit of tubercle in the corresponding kidney.

Description of a "Holed" Ureteric Orifice in Tuberculosis (Plates XIII, XXV).

On looking at the ureteric orifice one notices at once that it differs in shape from the normal. The usual pink

CHANGES IN THE CHARACTER OF THE URETERIC ORIFICE.



A narrowed, pouting, thick-lipped orifice denoting mild pyelitis.





An arched orifice denoting incipient dilatation of ureter.



A large "golf-hole" orifice in advanced destruction of kidney, such as exists in renal calculus and tuberculosis.

lipped slit or faintly coloured slipper-like orifice is replaced by a sharply cut or punched-out hole. This hole is on a level with the interureteric bar; that is to say, there are no lips visible, only the thin edge of the opening.

The size of the hole varies in different cases. It may be  or  (Plate XIII A). Usually the actual edge is of a whitish colour, and often smooth, but the edge near the urethra may be rough or ulcerated (Plate XIII B). The cystoscopist may notice that the hole is not quite in the usual place, being displaced a little to the edge of the bar (front or back). The deviation is most easily noticed in very thick succulent bars, but it is not very common. All around it there is highly reddened mucous membrane. Sometimes this is of an intense red, the colour being obviously due to submucous extravasation, and not to the surface being caked with blood or stained by it. To a practised eye the difference is at once apparent. The colour is not, I believe, any guide to the intensity of the disease.* In the florid, spongy mucous membrane around may be seen a few sparsely scattered, sharply refracting points; these are probably grey tubercle. Not infrequently there is one or more small, sharply cut, sloughy-based ulcers behind the affected ureteric orifice, and on the posterior wall or superior wall other evidences of tuberculosis will be recognised in the shape of red extravasated areas with white necrotic flakes on them, or pinched-up areas of deep red mucous membrane, or superficial erosions, or even circinate worm-eaten ulcerations.

The other ureteric orifice may be bright and healthy in contour and appearance, but often its lips are a little turgid and obviously swollen by propinquity with the in-

* Compare Case 35, page 496. May, 1899.—Cystoscopy of F—. Both ureteric orifices are reddened; areas around them are granular and inflamed; left ureteric opening looks especially involved because it is the deeper in colour. Feb., 1900.—Cystoscopy of F—. Right ureteric orifice golf-holed, a little displaced (?); left ureteric opening not noticeably changed; post-trigonal wall covered with red extravasation and superficial ulceration.

trigone. In nearly every case the capacity of the bladder will be lessened.

I have seen the other, and what should be a healthy orifice, after a prolonged course of vesical irrigation, showing the characteristic appearances of ascending septic uretero-pyelitis, the orifice being rounded, the lips swollen and pouting, and a few specks of pus mingling with the efflux. In one case—that of a lady—these points were well shown, and I declined to operate, for I was confident that the right kidney had been crippled by ascending ureteritis, and the left kidney was tuberculous, and I realised if I removed the tuberculous kidney (the left) the right would not stand the strain, and the patient would succumb to suppression of urine. A few months later the patient, a girl, suddenly developed a large right renal tumour. It almost as suddenly subsided, a large quantity of pus being passed coincidentally, and she died uræmic a week later, the cystoscopic diagnosis and prognosis being thus amply justified.

*The Pathological Condition of the Ureter possessing a
"Golf-hole" Orifice.*

What does this form of ureteric orifice denote? Does it indicate that the entire ureter is tuberculous? By no means. A "holed" ureteric orifice points to an inflamed ureter,—or, if I may put it so, to a "scalded" ureter. It is a sure sign that the wall of the ureteric tube is slightly thickened and somewhat atonic, that it will be found pale in colour and friable in texture, that the mucous membrane lining it will be found swollen but not ulcerated, and that on microscopy giant-cell systems will be probably absent. It has no reference to tuberculosis *per se*. It occurs in other cases besides tubercle (page 353). Moreover, if such a ureter is exposed to the sight and touch in the loin, the average operator would at once pronounce that ureter to be healthy. But there is evidence to show that such a ureter is not healthy, and that such a ureteric orifice is

a sign in a patient whose urine contains tubercle bacilli that a tuberculous deposit will be found in the renal parenchyma of the corresponding kidney. I repeat, there is probably a tuberculous deposit, sometimes very small, at other times quite abundant, in the renal parenchyma, and such deposit is always open to and discharges into the pelvis, and often the mucous membrane of the pelvis itself is ulcerated.

These statements are based on three operation cases which will show that the contention is sound, and therefore worth consideration, but it will be observed that in each of these three cases *marked renal pain* was present. That is to say, I did not feel at first justified in a nephrectomy, or even a renal exploration of a kidney whose ureter was merely "golf-holed," unless pain was complained of in that kidney,—unless, in fact, the localising symptom of renal pain was present to assure me that the disease was located in the kidney.

In the three cases which have been operated on the kidney was adherent at the upper or the lower pole or both. In two cases the kidney was removed within the first year of symptoms; *although the organ looked red and healthy, and although its surface was free from shot or crude tubercle*, yet the tuberculous deposit was found in the parenchyma, and there was a communication between the deposit and the pelvis, and from it was discharging that acrid tuberculous urine which had so scalded and so swollen the lining of the ureter that its orifice was changed from a slit to a round, clear-cut hole.

M—, æt. 34 (Case 29). There is a history that for twelve months he has had pain in the right renal region (costo-vertebral angle), and that for two months he has had bladder distress. Frequency: two hours day, two hours night; pain on urination from perineum to the glans penis and a little blood, all these symptoms being aggravated by exertion.

Tubercle bacilli were found in the urine in fair numbers.

Cystoscopy.—Right ureteric orifice was a narrow, sharp-edged "golf hole"—not apparently displaced. Around the opening were

deep red folds. Left ureteric orifice healthy. Posterior wall ulcerated superficially with adherent muco-phosphatic deposits.

FIG. 141.

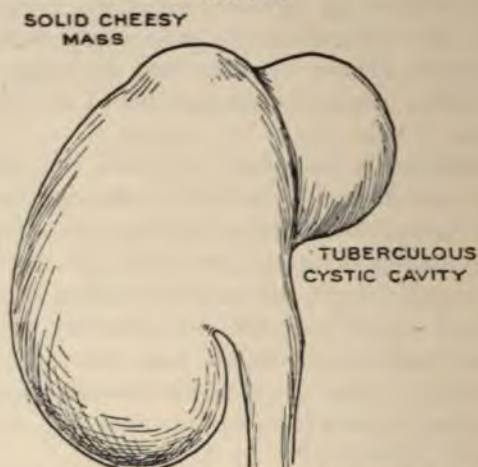


Diagram of M—'s kidney (Stanley Boyd).

FIG. 142.

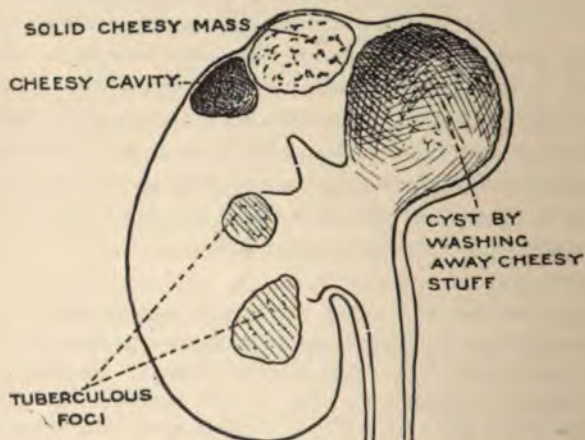


Diagram of longitudinal section of M—'s kidney (Stanley Boyd).

Nephrectomy.—Right kidney removed by Mr. Stanley Boyd, to whom I am indebted for his own rough sketches of the organ.

At and towards the upper pole was a hard yellow projection, the cortical expression of masses of crude tubercle (Figs. 141, 142). Two of the lower pyramids contained tuberculous material. The pelvis was swollen; its mucous membrane was soft but not ulcerated. Irritability of the bladder subsided completely, so that a few weeks after the nephrectomy the patient said he could hold his water any length of time.

Mrs. X—, æt. 29 (No. 36). In 1892 over-held water, and since then bladder distress. Frequency, pain, blood.

1893.—Dragging in left loin.

1897.—Cystoscopy. Left ureteric orifice a large golf hole, not displaced; right ureter healthy.

FIG. 143.

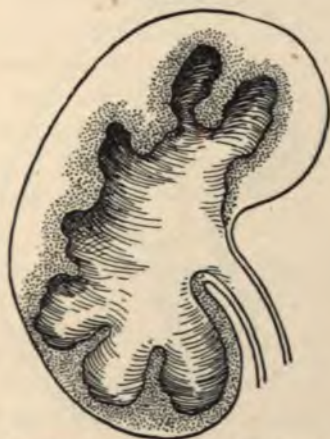


Diagram of tuberculous erosion of pelvis of Mrs. X—.

1897.—Left nephrectomy. Kidney very adherent; surface quite red, but cortex dimpling freely here and there on pressure of the finger. Longitudinal median section (Fig. 143) showed pelvis ulcerated, the parenchyma being hollowed out into small, irregular cavities, extending from the pelvis to the cortex, filled with creamy curd-like material and lined with tuberculous material, in which the tubercle bacilli were found. Largest cavity in lower pole. Ureter thin and narrow.

1899.—Cystoscopy. Left ureteric orifice unchanged—an irregular golf hole.

1900.—Still frequency.

1903.—In good health, but still frequency.

Mrs. L—, æt. 24 (Case 27). For twelve months has had suprapubic pain on lying down or stooping. It is worse on urination. Some pain in left loin occasionally. Frequency: ten minutes day, every half-hour night. Mother died, aged twenty-eight, of phthisis. Tubercle bacilli in urine in large numbers.

Cystoscopy (March 31st, 1900).—Left ureteric orifice a golf hole, not displaced. Right ureteric orifice healthy. Left lower wall posteriorly covered with small red pinchings-up of mucous membrane. Surface erosions and little points of hæmorrhage.

Nephrectomy (May 7th, 1900).—Left kidney large, appeared quite healthy; no shot of tubercle on surface, no crude tubercle visible.

FIG. 144.



Tuberculous erosion of upper and lower calices (Mrs. L—'s case).

The cortex of kidney dimpled at the upper pole, and on cutting it open a tuberculous cavity was seen. The kidney was thereupon removed; two irregularly excavated cavities lined with tuberculous material existed at the upper and lower poles. The main pelvis was soft and healthy; the ureter was healthy (Fig. 144). Much relieved in every way.

Clinical Conditions co-existing with a "Holed" Ureter.

It will be noticed that in these three which I quote, pain was present in the kidney. It would naturally be

expected that some such symptom referable to the kidney would be always present if the kidney is tuberculous, whenever the orifice is golf-holed, but this apparently is not so. In most of the cases (50 per cent.) there is no complaint of any renal pain. In only 28 per cent. is there any marked renal pain mentioned. Is the renal tuberculosis then latent? for the patient is only distressed by supra-pubic or rectal pain and by frequency of urination. I believe so. The connecting link lies in a case which consulted me for vesical irritability (Case 20). There was a golf-holed ureter, but there was never any renal pain in the entire history of the case, until a fortnight before the lady died. But even without this link I am satisfied that the kidney may be actively tuberculous without pain, for I have removed the kidney for advanced tubercle, and yet no pain has been noticed in the organ.

On glancing through this list of fifteen cases the reader will note how *early* the "golf-hole" condition was found in the symptomatology of the disease.

Fifteen Cases of "Golf-holed" Ureteric Orifices.

Case No.	Sex and age.	Bladder symptoms.	Kidney symptoms.	Condition of ureteric orifice.
1	F., æt. 24	6 months	14 days' right renal uneasiness	Right golf-holed.
3	M., æt. 24	2 months	None	Right golf-holed.
8	M., æt. ?	Some months	None	Left golf-holed.
16	M., æt. 28	1 month	2 months' left renal pain	Left golf-holed and drawn out.
19	F., æt. 44	18 months	Indefinite left loin pain	Left golf-holed.
20	F., æt. 24	18 months	None	Left golf-holed.
25	M., æt. 30	5 weeks	None	Right golf-holed.
27	F., æt. 24	12 months	Occasionally left loin pain	Left golf-holed.

Case No.	Sex and age.	Bladder symptoms.	Kidney symptoms.	Condition of ureteric orifice.
29	M., æt. 34	2 months	12 months' pain in right kidney	Right golf-holed.
34	F., æt. 32	5 years	None, but kidney uneasiness after Koch	Right golf-holed.
35	M., æt. 26	12 months	None	Right golf-holed.
36	F., æt. 29	4 years	3 years' dragging in left loin	Left golf-holed.
37	M., æt. 13	5 months	An occasional aching over right kidney 6 months ago	Right golf-holed.
40	F., æt. 33	5 months	None	Left golf-holed.
49	M., æt. 25	10 days severe bladder symptoms	None	Right golf-holed.

In one, ten days after the onset of symptoms, a well-defined chronic change was found in the ureter (Case 49). In another (Case 25) the same appeared after five weeks, and in several the same occurred after a few months. It is therefore important to hazard the question, How long does it take for these changes in the ureter to become so marked as to transform a healthy ureteric orifice into a golf-hole-like opening in the bladder?

I cannot hazard any average, but I may say I should think the change needed months, for I examined, in May, 1899, a male patient (Case 35) who had tubercle in the urine and symptoms of vesical tuberculosis of two months' duration. The cystoscope showed me that both ureteric orifices were deeply reddened, but the lips were unchanged. I examined ten months later (February 3rd, 1900), and I saw the right ureteric orifice golf-holed.

Now if it takes time to change the ureter, and this change is noted by means of the cystoscope *ten days* after the onset of symptoms of bladder tuberculosis, does it not point to latent disease of the kidney quietly affecting the

ureteric tube, and giving no evidence of its presence until the irritating urine erodes the bladder surface and a sudden attack of cystitis draws attention to that organ?

I have always held that primary renal tuberculosis occurs in the male in 16·8 per cent. of all cases;* but if we judge the question on cystoscopic grounds, the percentage in which the kidney is *primarily* attacked, and in which the disease descends to the lower urinary tracts, is higher. Israel believes primary renal tuberculosis to be very common. Among twenty-one cases operated upon by him, sixteen were apparently instances of primary infection.

Therapeutic and Operative Indications afforded by a Golf-holed Orifice in Tuberculosis.

Assuming that the interpretation of the facts just recorded is accurate, and that latent renal tuberculosis is present with a golf-holed ureteric orifice, it follows when the surgeon is dealing with a case with symptoms of early vesical tuberculosis—frequency at night, meatal pain, the tubercle bacillus, pus, and occasional blood traces being present in the urine—that the cystoscope should determine the absence or presence of a golf-holed ureteric orifice. The instrument should be especially employed in females and in males who present no evidence of genital tubercle. If a golf-holed ureteric orifice is discovered—and only one will be found in the early stages—the surgeon knows that he has got an open ureter, and can employ Koch's injection without danger.† Moreover he may assume, I believe, if

* I may remind the reader that many writers hold that the involvement of the kidney is nearly always secondary to disease of the lower urinary tract. Rokitsky, Klebs, Simon, Guyon assert this. On the other hand, many contend that as frequently as not tuberculosis is primary in the kidney, and *descends*, invading the bladder (Israel, Steintal, Hamill, Camargo); indeed, Hamill in fifty-five cases of renal tuberculosis in children found that nearly all began in the kidney (Hektoen-Riesman, 'Pathology,' vol. ii, p. 976).

† Koch's injection tends to cause swelling of those parts affected by tubercle; also to loosen and bring away small débris particles. Both these effects are dangerous if the ureter is narrowed or blocked.

no renal pain is complained of, that the deposit in the kidney is not large, and that it can be ameliorated by Koch's injection.

But if the case does not present itself early, say within a year, and renal pain is, or has been, a marked and continuous feature, nephrectomy of that side should be carried out. But here a word of caution. The pelvis is affected at first, not the cortex, so that no surgeon, in attacking a kidney which has been the site of *continuous pain*, should, if a marked golf-holed ureteric orifice exists on that side and tubercle bacilli are in fair numbers in the urine—no surgeon should, I say, be deceived by encountering a healthy red-looking kidney without shot or yellow blemish on its cortex, and possessing a healthy soft pelvis or ureter. The disease is within, and I have known the surgeon so deceived by the healthy cortex that he has replaced such a kidney. Let the operator examine first the upper and lower poles for dense adhesions. If they are found he should feel if the cortex is thinned, or if it dimples under pressure of his finger here or elsewhere. If it does, he can cut boldly* into the thinned area and examine the cut surface for tuberculous ulceration extending from an eroded pelvis. At either pole or at some other area on the cortex this evidence will be generally obtainable, and then nephrectomy can be conscientiously carried out, to the relief of the patient's lower urinary distress.

To recapitulate, a golf-holed ureteric orifice denotes a ureteric tube swollen and atonic, but not tuberculous; it indicates a tuberculous pelvis, and a kidney which, if renal pain has been a marked symptom, should be removed, the other kidney acting healthily; but if renal pain has been slight or absent it should be treated by courses of Koch's injections, for the ureter is open and can carry away the sloughs cast off by the action of the tuberculin. The golf-hole ureteric orifice may prove to be some index to the frequency of latent renal tuberculosis.

* A light spring vessel-clip on the renal vessels will render such a search bloodless.

B. The Displaced, "Dragged-out" Ureteric Orifice.

I have briefly alluded to this unusual condition, and have stated my opinion (page 204) that when it is met with, and tubercle bacilli are also present in the urine, it affords the most conclusive *cystoscopic* evidence that we possess of the partial destruction of a small, often unfeeleable kidney by tuberculosis. I will try to enlarge somewhat upon this theme, and to give reasons for my belief.

Original Case.

The case which brought the condition before my notice was seen by me in 1885, and noted as follows :

A man æt. 27 was under the care of a colleague with incontinence of urine. He had a renal tumour on the right side, very painful at one spot, and there was a history of renal colic over a period of four years.* The right kidney was opened and a quantity of pus evacuated. The patient died. On post-mortem I found the right kidney a multilocular sac, containing inodorous pus; cortex extremely thin; pelvis very much dilated, its mucous membrane ulcerated and tuberculous. The right ureter from the hilum of the kidney to the bladder was greatly thickened, especially in its upper third, where it resembled a thick thumb. Its small canal was eroded here and there with ulcers which were tuberculous, whilst dense clumps of caseous material blocked the canal at various points.

The left kidney was large and congested. Prostate: right lobe had two masses of crude tubercle the size of horse-beans.

On opening the bladder fine miliary tubercle was seen scattered over the eroded surface, interspersed with small yellow clumps of tubercle.

I noted especially—

1. The interureteric bar was much thickened.
2. The right ureter at its junction with the bladder was embedded in a mass of indurated inflammatory tissue.

* Author, "Case of Exfoliating Cystitis," 'Path. Soc. Trans.,' vol. xxxvii, p. 310, 1886.

3. That the right ureteric orifice, as seen in the bladder, was drawn quite out of its usual place, probably about a quarter of an inch.

4. That the muscle wall of the right side of the bladder was thickened in the neighbourhood of the ureteric tract.

This displaced ureteric orifice now attracted my attention in cystoscopy in reno-ureteric tubercle, and from the cases I have noted in which tubercle was proved to exist I feel certain I can make the following statements.

Aspect of the Dragged-out Orifice.

Instead of the ureteric orifice of the tuberculous kidney being an inch or an inch and a half from its fellow, and at the same distance from the urethral orifice, it is seen to be as much as two inches from either opening, the interureteric bar on which it opens being unduly lengthened. Moreover the wall of the bladder around the displaced orifice seems "pulled out," so that the viscus is slightly distorted, and a sort of funnel appears in the side of the bladder base, as if a finger and thumb had hold of the ureter in the loin and was dragging it upwards and outwards. Indeed, in one or two cases in which the diseased kidney had been fixed by the surgeon under the supposition that it was a movable kidney, the side of the bladder where the ureter is inserted was so dragged out that it formed a deep tunnel of mucous membrane, in the depth of which the ureteric opening could not be seen. When seen the orifice is distinctly changed, being patulous, irregular in shape, and its wall is thick and caked.

In every case ulcerations of a typical tuberculous type, with red patches of extravasation, were visible in other parts of the bladder.

Lastly, it would appear from my cases that the ureteric change takes years (average four to five) before it becomes characteristic, and is therefore essentially the type of chronic, long-continued change.

Pathological Characteristics of the Dragged-out Ureter.

One very salient feature will probably strike the observer at once. It is that the stress of the disease has apparently fallen upon the ureter, and has enlarged that tube so greatly it may even resemble a thumb or forefinger in thickness. This increase in size is mainly due to an enormous inflammatory thickening of the walls of the tube, for the centre channel is narrowed—so much so that on section the tube reminds one of a giant vas deferens. Often as not this fine irregular channel is blocked by caseous particles, and even on post-mortem its sinuous windings are difficult to follow.

In consequence of this ureteric obstruction there is almost invariably great renal destruction, for that noticed is more the result of urinary back pressure and inflammation than the effect of the tuberculous processes, although these are also present.

The kidney may be small, useless, non-secreting, its pelvis ulcerated, its calyces dilated, its cortex thinned, its small cavities filled with thin gruel, or inodorous pus, or cheesy material, and small phosphatic concretions; or, if infection has contaminated the obsolesced material, the kidney may be found inflamed, having rapidly enlarged until it has been transformed into a multilocular abscess sac, from which, under the pressure of the sudden accumulation, pus may leak little by little along the blocked ureteric channel into the bladder. Usually, I repeat, the kidney is a dry kidney, which has apparently given up work in an early stage of the disease from the block of the ureter; but it is one which still continues to cause renal colic or suffering of some severity.

The ureter is adherent in its entire course. Towards the bladder the ureter is found embedded in much inflammatory material, and as the canal enters the bladder, that part of the viscus is thick, indurated, and inelastic.*

Microscopically.—Great chronic inflammatory thickening of the walls is present; the lumen is lined by granulation

* Cf. original case, page 499.

is one in which the orifice of the ureter is retracted into the substance of the kidney. The kidney is enlarged & the ureter is dilated.

The Clinical Aspects of a Case of "Ischaemic" Nephritis

The clinical features of a case in which a "ischaemic" nephritis is present are usually different from those which are present in the "pyelitic" variety.

The "ischaemic" or "ischaemic" type of nephritis is usually associated with the presence of a "pyelitic" variety of nephritis. It is a disease which affects some parts of the kidney, but the affection is not general. It is a disease which is usually associated with the presence of a "pyelitic" variety of nephritis. It is a disease which is usually associated with the presence of a "pyelitic" variety of nephritis.

Moreover the character of the pain is usually that of renal colic, which, for severity and persistence, is in marked contrast to the "pyelitic" variety. In some cases the character of the renal pain has been that of "ischaemic" renal pain, the pain being in the absolute back in the lower part of the back, but in some at least the character of the pain is usually that of "ischaemic" renal pain.

Clinical Features of Cases of "Ischaemic" Nephritis				Character of Pain	Character of Urine
2	V	25	5 years' right renal pain (tumour)	-	Right orifice retracted.
11	M	25	5 years' left renal pain	-	Left orifice retracted.
12	F	25	5 years' right renal pain (tumour)	-	Right orifice retracted.
15	F	22	3 years' right renal pain	Thickened	Right orifice retracted.
23	F	40	5 years' right renal pain	1/2 inch in diameter	Right orifice retracted.
28	F	24	2 years' right renal pain	Enormously thick	Right orifice retracted.
41	M	27	4 years' right renal pain (tumour)	Enormously thick	Right orifice retracted.
42	M	2	-	Enormously thick	Right orifice retracted.
49	M	26	7 years' left renal pain	?	Left orifice retracted.

The condition of the kidney is in accordance with the tendency to ureteric obstruction. It may be swollen by the dammed-up tuberculous deposits and pus, and therefore feelable as a hard, tender, *fixed* tumour in the renal region, or the fluid part may be absorbed, and the kidney, becoming smaller, may retract under the ribs and be indistinguishable on palpation.

I have watched these fixed, enlarged tuberculous kidneys contract in size and retract in position in course of two or three years.

These statements may be exemplified by the following cases.

Miss McP—, æt. 40, brought to me in April, 1901, for cystoscopy.

History.—May, 1896.—Sudden attack of severe pain definitely referred to the right iliac region, accompanied by vomiting and vesical tenesmus. At first the attacks recurred at intervals of one month, but gradually they became more frequent, often a week only intervening. The lady was seen by an experienced physician, who thought an enlarged appendix could be distinguished "rolling under the finger." The urine showed a trace of albumen.

1897.—Right kidney found displaced; the attacks were therefore considered to be renal colic by a well-known hospital surgeon, and the kidney explored for calculus. "The kidney was incised, its pelvis explored; the renal substance and the pelvis were found perfectly normal." A urinary fistula remained for many weeks. It then closed, but reopened occasionally; pus always found in the urine in considerable quantities, and the old pain recurred from time to time.

November, 1900.—Much hæmaturia, with bladder tenesmus.

Cystoscopy (E. H. F.) (April, 1901, *five* years after the first renal symptom had appeared).—Right ureteric orifice and interureteric bar pulled right out of its place, the former being hidden by an overlapping fold of the mucous membrane of the right lateral wall of the bladder, the edge of the projecting fold being papillated and of a deep red colour. Small red tuberculous-looking areas over posterior and superior wall. Left ureteric orifice slightly swollen.

Diagnosis.—Chronic right renal tuberculosis with great thickening of the right ureter (periureteritis).

Operative indications.—Right nephrectomy and ureterectomy.

Prognosis.—Good.

May, 1901.—Tubercle bacilli found in urine.

May 23rd, 1901.—Right kidney and ureter removed by Mr. J. M. Cotterill, in Edinburgh. The following details were very kindly supplied to me.

The right kidney and as much as possible of the ureter were removed from behind. A great deal of adhesion was found as the result of the former operation. The ureter appeared uniformly thickened, rather more than one third of an inch in diameter. Its lumen was unobstructed. The kidney was about normal size, but irregular in contour. On section it looked at first sight like a "surgical kidney," and it presented three or four cavities the size of small hazel-nuts containing turbid fluid. There was no caseous matter visible anywhere to the naked eye, but there were numerous little grey nodules scattered over the surface of the organ and over the section. There seemed to be very little secreting kidney substance left. The renal pelvis was not dilated at all.

The kidney and ureter were submitted for microscopical examination to Dr. D. A. Welsh, who sent the following report:

"Sections in paraffin were made from the following parts:

"1. *Renal tissue in places not destroyed by excavation.*—This showed numerous foci of tuberculosis, both in cortex and in medulla. The resulting nodules showed caseation, numerous giant-cells, and usually an extensive overgrowth of connective tissue spreading out into the kidney tissue. Between these nodules the kidney showed some interstitial nephritis and chronic catarrh.

"2. *Renal tissue bounding walls of cavities in kidney.*—The sections represent the whole thickness of the renal tissue between the cavity and the capsule. The lining of the cavity consisted in tubercular granulation tissue containing some giant-cells. The overlying renal tissue showed an extreme degree of chronic interstitial change, with obliteration of most of the glomeruli (which were reduced to hyaline necrotic masses) and atrophy of the tubules. The interlobular arteries were largely occluded by a proliferative endarteritis.

"3. *The ureter (about two inches beyond the hilum of kidney).*—On cross-section showed great chronic thickening of its walls. The lumen was lined by granulation tissue, in which giant-cells were present. The lining epithelium had entirely disappeared. The lumen, however, was quite patent, a fact that is consistent with the small size of the excised kidney, and the absence of any degree of pyonephrosis. Moreover, in the sections of the kidney in its more healthy portions there was some tissue left which would be capable of secreting to a small extent.

"4. *Sections were made of the renal pelvis also, but, beyond the*

fact that it appeared to be lined by granulation tissue, I could not make much out of it, owing to the way in which the sections had been made."

I can add an interesting sequel-fact to the above. The lady returned to me for cystoscopy in October, 1901, after having several courses of Koch's tuberculin.

Right ureteric orifice, which before was invisible and dragged out, now visible in its proper place, but the opening is gelatinous and indistinct. Over the posterior wall a few patches of red submucous extravasation still remain. Left ureteric orifice swollen, but not enlarged. Patient apparently in the best of health, and free from all symptoms.

Another case, but one in which from first to last no tubercle bacilli could be found in the urine. I specially quote this because I believe it is not an uncommon feature of this particular group.

Mrs. L—, æt. 24, sent by Dr. Fowle, of Singapore.

July, 1896.—Pain in right side over front of kidney. Tried to make water and could not. After an hour's straining she passed it. Slight traces of albumen found.

August, 1896.—Married.

December, 1896.—Pain on urination; also a dull pain in right side.

February, 1897.—Frequency in micturition, and pain in bladder in coition. Could not lie on right side, because of the pain it caused in her bladder. Can sleep on left side.

Cystoscopy (July, 1898).—Right ureteric orifice like an open miniature crater; edges very red, and tucked in "as if a finger outside the bladder was drawing the ureter up into the loin." Pus efflux in puffs. Left ureteric orifice healthy. Bladder held 12 oz. Patches of red infiltration on posterior wall.

Nephrectomy (July, 1898).—Right kidney very adherent, especially at upper end, but not tuberculous to sight or touch. Pelvis wall thickened. On section the entire kidney was seen to be eaten out into larger and smaller tuberculous abscesses, containing gruel-like pus. Aspect typical. Ureter enormously thick, like a huge thumb. Channel minute. It was resected to brim of bony pelvis. Healed readily.

1899.—Pregnant. Gave birth to fine boy.

Cystoscopy (July, 1900).—Right ureteric orifice: two columns of

scar tissue seemed to arise from this orifice and radiate backwards to the postero-superior wall. Left ureteric orifice not seen. Entire posterior wall covered with small fine tubercles, some yellow-spotted.

July, 1901.—Bladder certainly reddened, but no ulceration. The right ureteric orifice not particularly noticed, but streaming vertically from its position were two or three strong scar bands in the mucous membrane. Left ureter red, unhealthy; lips a little thick.

July, 1903.—Well. No frequency. Boy strong and well grown. Husband dying of phthisis.

Mem. (July 6th, 1898).—No tubercle bacilli in urine.

July 7th, 1898.—No tubercle bacilli in urine.

June 9th, 1902.—No tubercle bacilli in urine.

July 3rd, 1902.—No tubercle bacilli in urine.

March 10th, 1903.—No tubercle bacilli in urine.

Probable Cause of the Dragged-out Ureteric Orifice.

After investigating the fact of the "dragged-out" orifice in renal tuberculosis I cannot but suspect the following cause:—In every case which I have been able to operate upon, or examine the ureter visually and digitally, that tube has been more or less thickened, ranging in size from a thick lead pencil to a thumb. In every case the kidney and the entire ureter have been fixed by adhesions. This fixation is merely inflammatory (a natural effort to shut off the dangerous element from the otherwise healthy body). The contraction which takes place in course of time in this inflammatory mass, in its length, puts the ureteric tube on the stretch. Moreover, I suggest that in certain cases there is a great tendency to fibroid change which increases the retraction. Perhaps the clue to the causation of fibroid phthisis would furnish the correct solution to the problem of these retracting ureters. Any way, in some cases the "drag" on the ureter seems to arise when the kidney recedes under the ribs towards the liver or spleen, as it often does in inflamed kidneys. In other cases the "pull" appears to be from the contraction in the length of the lower ureter.

I have seen, I think, a markedly dragged-out ureter assume its proper position in the trigone after its kidney had been cut away, and the ureter acted on by tuberculin (Koch's new T. R.)—in other words, when the cause of the "pull" was removed. But I have seen, I must admit, an orifice gradually "dragged out" after the kidney has been removed, the bladder being thrown into deep folds at the circumureteric area (Case 32). I mention these conflicting cases, I cannot reconcile them at present; probably increased experience will afford a clue.

Certain questions of importance present themselves.

Is a displaced ureteric orifice a mark of chronic renal tuberculosis, or does it merely indicate chronic infiltrating ureteritis?

I have certainly met with minor grades of displaced orifices in cases of simple infiltrating ureteritis, but I have not seen a typically dragged-out opening except when tubercle was present in the kidney, and there was great thickening of the entire ureter. Still this may be an error which increased experience may rectify.

I do not wish to convey the impression that the anomalous position of the orifice is the direct outcome of renal tuberculosis, for many cases will be met with in which chronic renal tuberculosis is present, and yet the ureteric orifice is in its normal position, though its contour and appearance will be altered. It was present, in fact, in only nine cases out of 50 of urinary tuberculosis (18 per cent.).

Is the displaced ureteric orifice a mark of primary ureteric tuberculosis?

The renal pain and colic frequently noticed as onset symptoms in these cases rather point to the occlusion of the ureter as being an early change, which leads to the suspicion that in this class of case we have to do with *primary ureteric tuberculosis*. In fact, I believe I have met with a case which will substantiate this belief—a case in which the ureter was enormously thickened and

blocked, and the kidney merely atrophied (page 201). I have also removed a kidney in a very early stage of tuberculosis in which the lower ureter seemed shut off by great thickening, but in which there was no change in the ureteric orifice (case on page 519).

It is significant in most of the cases I have operated upon with greatly thickened ureters that the renal changes appear to be mostly due to back pressure, though tuberculosis is also present. I have been much impressed by a series of four cases in which the ureter was invaded by a psoas abscess. In these the thickening of the ureter and the ulceration of its mucous membrane were somewhat similar to those noticed in ureters with displaced orifices.

I opened a right lumbar abscess in a woman and evacuated 20 oz. of pus, removing at the same time a piece of bone from the second lumbar vertebra. The entire length of the right ureter was thickened, and in size, shape, and feel it resembled a thickened vas deferens. Here and there it was knotty—the *kidney felt intact*,—a statement which may not be worth anything. On cystoscopy the right ureteric orifice was small and round, and had its lower lip ulcerated.

The Causation of Chronic Infiltrating Ureteritis in Renal Tuberculosis.

Why there should be so great a swelling of the ureter in a comparatively small number of cases of urinary tuberculosis is a subject upon which I must not dogmatise.

It is interesting to notice how often these cases occur on the right side, and that not infrequently the microscopy reveals a short bacillus in the urine which might be classed as a variety of the colon bacillus.

If I might speculate, I should rather lean to the theory of a mixed infection—the penetrative power of some form of bacillus irritating the middle and outer coats of the ureteric tube; and I would question whether we have not similar changes in the extreme thickening which takes

place around the kidney (perinephritis) in certain cases of pyelonephritis. Perhaps also an analogy exists in the great thickening of the abdominal wall in chronic appendicitis, with formation of pus in the cellular tissues behind the cæcum.

Clinical Deductions.

To my mind the two main lessons I have been taught by a retracted, displaced ureteric orifice (tubercle bacilli being found in the urine) are these :

The ureteric channel is too warped and contracted to allow further passage of the waste products cast off from the kidney by the action of the new tuberculin. Its exhibition is therefore attended with some danger by causing the kidney to swell with retained discharges. Secondly, the extreme amount of perinephritis and peri-ureteritis is nature's method of walling in tubercle and limiting its action. Hence the chronicity of such a case, and in absence of septic infection of the bladder and the opposite kidney, the comparatively favourable prognosis and the hopeful outlook after nephrectomy.

But it must not be concluded that the "dragged-out" orifice is the only cystoscopic indication of a thickened or choked ureter. The probability is that the mere *displacement* of the orifice is the *final* expression of a *greatly* thickened ureter, and that lesser grades of thickening are seen earlier in the course of the case, and the cystoscopic evidence of these lesser degrees of thickening is not so much the displacement as the visible change in the structure and contour of the orifice, its edges becoming thickened, inlaid often with a wax-like substance, the opening thereby rendered irregular and warped. This condition, then, forms our next group of official changes in tuberculosis.

c. *An Irregular, Thickened, Choked Ureteric Orifice denotes a Thickened, Choked Ureter.*

I cannot, perhaps, illustrate this condition better than

by quoting one of the cases in which the appearance was well marked.

Mrs. B—, æt. 21 (Case 39), sent by Mr. McGregor Young, of Leeds, in October, 1899.

In September, 1896, three years ago, she suffered from severe *left* renal colic, the pain commencing over the front of the organ. These attacks recurred twice or thrice a week, always with pus in the urine. She was said to have a movable right kidney, but tubercle bacilli were found in the urine, and I was asked to cystoscopy.

Cystoscopy (October, 1899).—*Left* ureteric orifice: a distinct visible thickening of the left ureteric bar, and on it was a small, round, much narrowed, normally placed opening of the left ureter, with a little tongue of red mucous membrane prolapsing from it like a caruncle in the female urethra. Right ureteric orifice healthy. Bladder healthy, though it is *three* years since the renal colic commenced, only the veins of the post-trigonal space being large and markedly full.

Operation.—*Left* kidney small and adherent. A small shot-like tubercle on the cortex at the upper pole of the organ, otherwise kidney looks healthy. On section the pelvis was seen to be extensively eaten out into tuberculous cavities. The *ureter* was thick like a huge lead pencil, and at its orifice with the renal pelvis there was a thick layer of crude tubercle.

Mr. J. H. Targett reported: "The surface of the kidney is coarsely nodular, but the capsule is not adherent. On section there is caseous pyelitis, and numerous breaking-down foci in the cortex. Microscopical examination shows an abundance of grey and caseous tubercle in the cortical substance, and much evidence of interstitial nephritis with fibroid glomeruli, and atrophy of the glandular tubules."

September, 1900.—Patient married.

July, 1903.—Mr. McGregor Young reports: "At present she is in excellent health, and pregnant six or seven months. This is the third time she has been so. It is a curious fact during each of these three pregnancies (one of three months, the second of six months, and now this of seven months) she has been in exceptionally good health. Between these times her health is of the delicate order. She has no bladder symptoms and no kidney pain, and no albuminuria at any time."

The cases I have had of choked ureters are probably four in number. I have seen more, but I cannot quote

them without the discovery of the tubercle bacillus or operation to demonstrate beyond doubt the presence of tubercle, and these clinical essentials were lacking. This reservation introduces the remark that all warped orifices are not tuberculous. They point merely to a choked ureter, viz. one that has undergone chronic inflammatory change.

No.	Sex.	Age.	Symptoms.	Ureter.	Condition of orifice.
17	M.	24	13 months' attacks fixed left renal pain	Blocked and pyelitic (nephrectomy)	Left side everted, lip ulcerated, circumureteric area ulcerated and cedematous.
18	M.	37	2 years' right renal pain, fixed	A little thickened; no lumen (nephrectomy)	Right small, red, and contracted; surrounding area blotched with blood.
39	F.	21	3 years' left renal colic	Ureter, like a large lead pencil, blocked at pelvis (nephrectomy)	Small, narrowed, and thickened.
46	M.	?	3 years	?	Circular, dull grey; blotched with blood.

D. Massive Edema of the Ureteric Orifice.

There is one condition which is apparently rare (6 per cent.) in primary renal tuberculosis, and yet sufficiently characteristic to merit attention. I refer to an enormous swelling of the ureteric lips and area. It may be that this is but an early stage of the periureteritis which I have just discussed—for the symptoms are the same and the cases I have observed have all been right-sided. It is, as I have pointed out (page 472), not uncommon to find an enormous œdema of the orifice when a stone is lodged at or very near the ureteric opening and is causing a local venous pressure, either mechanically or by the inflammatory reaction it induces, but it is rare in tubercle.

I have only met with it on three occasions—Cases 22, 23, and 30.

A young lad, æt. 19, was sent to me by Dr. Weakley for right renal pain, which he had suffered from for twelve months on and off. It was not severe, and there was no nausea and no other symptoms. Finding a little pus in the urine, I examined with the cystoscope, and found the right ureteric orifice and its immediate surroundings puffed out into a globular cedematous swelling the size of a large monkey-nut. The little tumour was almost translucent; it glistened under the light, the thin vessels marking its surface like watered silk.

The left ureteric orifice was healthy.

The urine contained tubercle bacilli in small numbers. There was a small amount of pus. Minute ill-formed crystals of calcic oxalate. No casts. A few renal pelvic cells and a trace of albumen.

He was given two courses of Koch's new tuberculin, and again examined. The cedematous orifice was flattened, but still protuberant, and was distinctly of a darker colour.

He left for South Africa, and on his return two and a half years later he reported himself well in every respect. I cystoscoped, and found the right orifice normal in every respect and the rest of the bladder healthy. On examining *per rectum* I detected a small tuberculous deposit in the right lobe of the prostate. There was no tubercle in the urine.

No.	Sex.	Age.	Symptoms.	Condition of ureteric orifice.
22	M.	30	Right renal pain	Right ureteric orifice enormously puffed.
23	M.	38	2 years' right renal pain; colic	Right ureteric orifice enormously puffed.
30	M.	19	12 months' occasional right renal pain	Right ureteric orifice greatly puffed.

The Analogy of Œdema of the Orifice with Œdema of the Ureter in Impacted Oxalate of Lime Stones.

Without straining a point, I notice that in one case of œdema of the orifice in renal tuberculosis (Case 30) the urine contained oxalate of lime crystals. It is a fact that

most of the instances of huge œdema of the orifice in descending stone (v. p. 472) occurred where the calculus was composed of oxalate of lime. But more than this. On two occasions, when I have had to cut upon the upper ureter for impacted stone, I have found a section of that tube quite bulbous, and in appearance exactly like a greengage plum. The tissues were œdematous and of lightish green colour. After dissecting through many juicy layers a small oxalate stone was found in the centre. I have only seen this condition twice. Although the causation is not apparent, yet the above facts rather suggest that oxalates have the power of producing marked œdema of the mucous membrane, and it may be that it is the co-existence of an oxaluria which determines the unusual orificial swelling in renal tuberculosis, to which attention has just been directed (p. 511).

To recapitulate, as far as I can judge, the classes A, B, C, D, relate to changes descending from the kidney to the bladder.

In the first—the “golf-holed orifice”—we have evidence, I think, of latent early tuberculous disease of the kidney scalding the ureter, but renal symptoms are not always present.

In the third—the narrowed, irregular, choked orifice—we have, I think, an advance upon the first in the point of age; in other words, a contracting channel.

In the second—the “displaced orifice”—we have the channel retracting and pulling the opening away from its normal position.

In the fourth we have a doubtful early acute pyelitis of tuberculous origin swelling the orifice.

The weakness of the matter is this. In every case the clinician must be satisfied by bacteriology or the cystoscopy that he is dealing with urinary tuberculosis, for in no case are the changes in the ureteric orifice the outcome of tuberculosis *per se*. They are merely the evidences of the inflammation which tuberculosis induces in the ureter in about 50 per cent. of all cases.

We have now to discuss the remaining cases, and some of the appearances seem to me to mark an "*ascending*" change, but of this I cannot speak at present with certainty.

E. *The Ureteric Orifice and Area are lost in a Vivid Red Submucous Extravasation of Blood.*

It is difficult to say what this appearance may denote. It is a definite change. The entire orifice and area are so blurred in a scarlet or dull red hæmorrhagic blotch that the details of the orifice are not clear, and often the opening itself cannot be distinguished.

The most characteristic case was that of a woman æt. 47 (Case 45), sent me by Mr. Gifford Nash, of Bedford.

Twenty years ago she had had symptoms of left renal pain, which was apparently due to intermittent ureteric obstruction. Thus the pain commenced in the left side; it passed towards the navel. She threw herself about, drank hot water, and in half an hour to an hour the pain left her and she passed a quantity of water.

She married and had children, and was free from any renal symptoms after childbirth. ? Fixation of kidney after uterine pressure.

At the age of forty, that is seven years ago, the left renal pain returned, though less violent. Two years ago a knife-cutting pain appeared in the urethra when she micturated, also frequency. This pain became continuous and was increased by exercise, so that now she is unable to walk.

The cystoscopy revealed the entire left half of the bladder to be white and scarred with old surface erosions. The left ureteric orifice could not be seen; its area was scarlet with submucous hæmorrhage.

Nephrectomy.—I removed a tuberculous multilocular left renal sac, the pedicle being embedded in tough fat, and the ureter as thick as a lead pencil, the channel being small. She recovered, but still suffered much from vesical irritability.

It cannot be said that the deep circumureteric extravasation points absolutely to renal implication. One sees it, but less marked, in descending stone when that body has reached the vesical orifice of the ureter (cf. p. 470), but

it certainly demonstrates that the ureter is becoming implicated. I append the cases I have noticed, and must await further experience for a clue to the direct indication which the appearance may convey.

Case.	Sex.	Age.	Bladder symptoms.	Kidney symptoms.	Aspect of ureteric opening and area.
3	F.	25	No symptoms, though posterior wall was peeling	None	Right, deep red.
21	F.	23	3 years' cystitis	Aching right kidney	Right, lost in general redness.
44	M.	40	6 months' cystitis	None; right kidney movable and enlarged	Right, blood-red and ulcerated.
45	F.	47	2 years' bladder	Pain in left kidney for 7 years	Left, obscured by a scarlet extravasation.
47	M.	14	6 months' bladder	2 days' pain in right kidney	Right, deep red.
50	M.	32	6 years' bladder	None	Right.

F. *Unclassified Changes.*

It is, of course, unsatisfactory to find there are appearances which cannot be classified, but I am unable to group a few, for the appearances of the ureteric orifices and their surroundings under the influence of extensive vesical ulceration are so varied.

In one (Case 4) the orifice was so detached by surrounding ulceration that it looked like a loose empty sleeve-cuff. Others were thoroughly eroded or buried in ulcers (Cases 7, 14). In another there was a mound-like swelling of the entire left ureteric area, powdered with white lime phosphate. This may have been a massive œdema of the orifice (*vide* page 472) covered with white gravel (Case 32), for I removed the left kidney; it proved to be a large, suppurating, tuberculous kidney, and the ureter was thickened. I examined this case a year later. To my surprise the left ureteric orifice could not be seen; it was pulled out of its place, the bladder being thrown into

deep folds at this spot. The right ureteric orifice was undergoing changes.

In two others (Cases 9 and 12) the ureteric orifice showed warping and irregularity, and seemed surrounded by a thick greyish film.

Analysis of Fifty Cases of Proved Urinary Tuberculosis.

				Per cent.	
The "golf-holed" orifice	...	...	15	...	30
The retracted orifice	...	...	9	...	18
The choked orifice	...	...	4	...	8
Massive œdema of the orifice	...	...	3	...	6
Vivid red periureteric extravasation	...	...	6	...	12
Unclassified	...	...	7	...	14
No changes visible in the orifice	...	...	6	...	12
				—	—
				50	100

CHAPTER XXVI.

CASES OF RENAL TUBERCULOSIS IN WHICH NO CHANGE IN THE URETERIC ORIFICE COULD BE SEEN.

CASES of primary tuberculosis of the bladder, in which the ureteric orifice appears only a little swollen or not at all affected, must come under the observation of the cystoscopist, for the ureteric orifice is not always affected quickly in *vesical* tuberculosis, and patients are beginning to present themselves for routine cystoscopic diagnosis at very early stages of their clinical history.

Moreover, it would seem that there are well-marked cases of renal tubercle in which the disease appears to be shut off from the bladder by interstitial contracting ureteritis, and these do not appear to affect the bladder readily, nor alter the appearance of the ureteric orifice early. Then, again, I suspect some cases of chronic interstitial nephritis become infected with tuberculosis, and in these complex cases the ureteric changes may not be noticed early.

I will enumerate the six cases I have met with in the last fifty of my work, and then especially mention those in which renal tuberculosis existed without any evidence of the disease appearing in the corresponding ureteric orifice.

Nothing Abnormal with Orifice.

Case.	Sex.	Age.	Symptoms.	Ureteric orifices.	Bladder and kidney.
5	M.	23	4½ years' symptoms like vesical stone	Both healthy	Greater part of bladder covered with tubercle.
43	M.	23	3 or 4 months' vesical symptoms.	Both healthy	Red infiltration on left side; scarred bladder.
			Second examination, 4 years later, increased vesical symptoms	Both healthy	"
6	M.	24	1 year, intermittent symptomless hæmorrhages	Both swollen slightly	Posterior wall patched with extravasation.
10	F.	35	1 year of vesical symptoms; pain in left kidney occasionally	Both healthy; no signs of septic invasion of pelvis	Tuberculous ulceration of posterior wall; nephrectomy; left renal tuberculosis.
33	F.	33	5 years' bladder symptoms; 9 days' right renal pain	A little swollen	Nephrectomy; right renal tuberculosis.
38	M.	25	6 months' pain in left kidney	Not altered	Nephrectomy; left renal tuberculosis.

The cases I want to glance at more narrowly are four in number—Cases 6, 10, 33, and 38.

Case 6 was apparently one of intermittent *symptomless* hæmorrhage in a young man æt. 24, brought by Dr. Hewer. It had been noticed a year. The bleeding was bright; it was on more than one occasion accompanied by clots, and on the last occasion, which was accompanied by "discomfort" over the left renal pelvis in front, a doubtful ureteric clot was passed.

On cystoscopy both ureteric orifices were swollen and reddened, the left a little elongated. The entire posterior wall was patched with red tuberculous extravasation and pea-sized ulcers. Tubercle bacilli were present in the urine.

All that I can say definitely in this case is, that there was discomfort over the left renal pelvis for three weeks, with only swelling and elongation of the left ureteric orifice.

But in the next case the orifices were more definitely free from change.

CASE 10.—A woman æt. 35, who had suffered from vesical symptoms for one year (scalding on urination, pain in supra-pubic region, increased on movement, blood in urine, bladder tender to pressure; frequency twenty times an hour), complained of occasional left renal pain. The urine was 1007. There was much pus, and tubercle bacilli were present.

Cystoscopy revealed both ureteric orifices to be healthy. No signs of ascending inflammation were present, but the bladder tubercle was obvious in the typical ulceration of the posterior wall, especially at the right lower section.

Eighteen months later this patient returned with an enlarged left kidney. I removed it but without cystoscopy to see the corresponding ureteric orifice. The kidney was very adherent; the vessels were embedded in tough fat. On section, typical tuberculous ulceration of the pelvis was present. The ureter was healthy but a little swollen.

This case is mentioned, but it will be conceded that it is incomplete. Unfortunately no cystoscopy was carried out prior to the nephrectomy, and changes in the orifice may have occurred in the interval between her first and second visit, for eighteen months had elapsed in this interval.

But the next is a definite case of latent renal tuberculosis—not very advanced, it is true, but without any visual change in the corresponding ureteric orifice.

CASE 33.—A lady was sent me with a history that she had had vesical suffering for five years, and nine days only of right renal pain. No renal tumour. Tubercle bacilli in urine in considerable numbers.

Cystoscopy showed the right ureteric orifice to have thick lips and to be pouting a little, but there was no retraction. Left ureteric orifice was a healthy slit; its lips were a little swollen.

I removed the right kidney; it was small, easily dislocated, not very adherent. The cortex looked quite healthy, except for two small shot or tubercles at the lower pole. About the middle of the anterior surface I found a thin line of crude tubercle. The cavity of the pelvis was eroded into tuberculous cavities.

The pelvic wall was thick, likewise the ureter. There were no typical giant-cell systems in the ureter, but the inflammatory tissue in the outer coat of the tube was arranged in well-defined nodules, which was very suggestive of tuberculosis. The mucous membrane was unaffected. Four and a half years later there were no bladder symptoms.

The last case I have to record is an interesting example of well-marked renal tuberculosis without ureteric orificial change.

A patient, a male aged 25, was sent to me with a kidney radiograph and a diagnosis of four small stones in the left kidney. There had been no vesical symptoms, but great pain in the left kidney for six months. The urine was stated to be absolutely normal; no blood nor albumen, sp. gr. 1022, only a few pus-cells.

I disagreed with the X-ray diagnosis, because the shadows were small and much scattered.

On cystoscopy I found there was no abnormality about the left ureteric orifice. It might possibly have been a trifle larger than the right. The vessels of the trigone were unusually well marked, but there was no evidence of tubercle in the bladder.

Nephrectomy.—On cutting on to the left kidney I found it much enlarged and very adherent, but there was no evidence of tubercle on the surface. I introduced a trocar into the body of the organ and drew off some ounces of inodorous pus and urine. Controlling the vessels at the hilum I laid the kidney open along the cortex, and found the pelvis to be tuberculous. I thereupon removed it. On bisecting it, each pyramid was seen to be almost eaten away into irregular cavities, the base of each being occupied by crude tubercle which had not broken down (Plate XXVI). The pelvis was thickened and dilated, the mucous membrane deeply congested and inflamed, but not ulcerated. The ureter for the upper four inches was dilated and thick-walled. It was blocked below by interstitial thickening. This case, I presume, is one of primary renal tuberculosis with interstitial ureteritis, the channel of the ureter being blocked about the pelvic brim; as no tuberculous pyuria issued into the bladder, there was no real swelling or change at the ureteric orifice.



Vertical section of tuberculous kidney of J. L., showing extensive destruction of pyramids and crude tubercle in the cortical zones. Nephrectomy: relief.
(Author's case.)



CHAPTER XXVII.

THE VALUE OF URETERIC MEATOSCOPY IN CASES OF CHRONIC PAIN EXPERIENCED AT OR NEAR THE REGION OF THE APPENDIX VERMIFORMIS.

I MUST omit many interesting points in connection with ureteric meatoscopy, for neither time nor space permits me to deal with them. I cannot, however, leave the subject without drawing especial attention to a very important pitfall—that of attributing all pain complained of in the region of the appendix to disease of that body. It is held—and more especially since appendicitis has become fashionable with us—that any marked pain or tenderness in this region with co-existing derangement of the bowel should raise the question of operation upon the appendix. This is a fertile source of error. I believe there are few consultants who have not made the mistake of diagnosing right renal or ureteric disease as appendicitis, and the difficulty is acknowledged by several.* I do not suggest that I have been blameless in this respect, but I do assert that ureteric meatoscopy has occasionally saved me from this error when no swelling in McBurney's area was present to guide me to a correct interpretation of the case.

As a matter of fact the pain of movable right kidney is

* Mr. Jonathan Hutchinson, jun., on renal stone ('Brit. Med. Journ.,' Oct. 19th, 1901, p. 1134), says he has excised a normal vermiform appendix in a young man for attacks of what he and two physicians mistook for appendicitis. Ten days after the operation he passed a small renal calculus.

mostly felt at the appendix area, whilst stone descending the right ureter can simulate appendicitis very remarkably. In many, the use of the cystoscope will show changes of the right ureteric orifice and establish the true diagnosis. The characteristic changes chiefly seen are those of dilated renal pelvis, or of pyelitis, or of descending stone. The features of these have been already described and illustrated in the foregoing pages.

I could bring forward a fair number of cases, but I will select three or four from the practice of well-known operators in large hospitals.

CASE 1.—Mr. J—, æt. 27 (O. Per., vol. v, 164), was sent to me for treatment of a cystitis supposed to have originated after an operation for the appendix.

His history was that eighteen months ago he had influenza and then appendicitis, pain being felt in the usual place and in the right loin. He was operated upon, and the appendix was removed during a "quiescent" stage. But exactly the same symptoms recurred, each attack becoming more severe. Finally the right kidney swelled until it became a visible tumour, a large quantity of pus was passed naturally, and all the pain ceased. Cystitis now supervened, and he came under my care.

Cystoscopy.—The bladder was very slightly inflamed. The right ureteric orifice was large and open, its edge was ulcerated; a small oval stone like a small egg lay on the bladder base; the left ureteric orifice was healthy. I evacuated the calculus.

Obviously the case had been one of descending right-sided calculus.

CASE 2 (Vol. Pr., 58, 54).—A lady, æt. 22, was prematurely confined of her second child, and suffered from retention and cystitis. In convalescing she was seized by a violent pain in the region of the appendix, her temperature rose to 104° , and there was vomiting, constipation, and other symptoms incidental to fever. An operation was hurriedly performed and the appendix removed. All the stitches suppurated, and healing was greatly delayed. The convalescence from the operation was marked by recurrent attacks of fever, vomiting, right renal pain,—in fact, by all the symptoms which were stated to have necessitated the appendicectomy. A fresh practitioner diagnosed right renal suppuration, which was

confirmed by a fresh consultant. I was asked to cystoscope. Right-sided pyelitis was obviously present, and the case was so urgent that the right kidney was opened, although the temperature was 104°, and a small phosphatic stone removed. There was an uninterrupted recovery.

CASE 3.—Male patient presented himself with obvious right renal tuberculosis, with deposits in the right epididymis and right lobe of prostate. He had a long fresh scar in the appendix region. The operation, which he asserted had been for the removal of the appendix, pain having been complained of in that region with fever and constipation, had not made any change in his symptoms, or caused him the slightest relief.

CASE 4 (Pr. vol. 42, 4).—I was called to see a lady with a very large abscess in her right kidney. A long scar crossed the appendix region, and I learnt that that body had been removed a few weeks previously for supposed appendicitis. The kidney was removed.

There is, however, a clinical difficulty still greater than that which I have just illustrated. I refer to a co-existence of inflammatory disease of the appendix with that of the right ureter.

In certain cases, which I believe, however, are rare, the diseased appendix appears to infect the right ureter. Mild pyelitis, and finally pyelo-nephritis of the right kidney is induced. These latter changes cause aching in the right lumbar region, and if the right kidney is at all movable, and the ureter badly inserted into the renal pelvis, destructive right renal changes ensue. The diseased appendix may be removed, but the right kidney still continues to ache, pus still continues to appear in the urine, and not infrequently the *Bacillus coli communis* is found in it. Cystoscopy shows swelling of the right ureteric orifice. In such cases I prefer attacking both viscera at one sitting.

CHAPTER XXVIII.

THE VALUE OF THE CYSTOSCOPE IN DISEASES OF THE PROSTATE GLAND.

THIS method of examination will not be found of much value in diseases strictly localised to the prostate gland, or mainly affecting it; in fact, with the exception of determining the presence or absence of a median or a lateral intra-vesical projection of the enlarged prostate, especially in those cases which are felt to be of normal or of nearly normal size *per rectum*, the cystoscope is often positively harmful. It is obvious that the prostatic channel when distorted by inflammation, tuberculous deposit, stone, or growth offers so much obstruction to the passage of the instrument that undue violence has to be exercised before the operator can introduce it. The immediate result of such action would be a hæmorrhage which would in itself prevent an accurate visual diagnosis being made, and the remoter effect would probably be an inflammation of the gland, which might lay the train, or indeed light up an explosion of vesico-ureteric, and even renal energy of a disastrous nature.

But even with these drawbacks it cannot be said that the cystoscope is useless in the "prostatic" age (æt. 45 to 70), for if its introduction is *easily* effected, the operator is enabled to diagnose median and lateral intra-vesical outgrowths of the gland, and to detect other vesical conditions such as encysted stone, which may guide him in the selection of an appropriate line of treatment. A few hints, therefore, upon the judicious selection of cases

of senile enlargement of the prostate for cystoscopy will not be inappropriate.

Selection of "Prostatic" Patients for Cystoscopy.

1. *Preliminary cross-examination relative to Renal Function is imperative.*—It should be a rule, and one which should be most rigidly enforced, that no patient over forty-five, suffering from nocturnal incontinence, great thirst, and morning nausea should be submitted to cystoscopy. The examination will only end in disaster, and usually the only clinical evidence obtained by it will be the demonstration of a small median prostatic lobe. The clinician need not assume because the urine is brilliantly clear, and because it contains no casts and no albumen, that the kidneys are working well, and therefore a cystoscopy is harmless. Such an assumption is indefensible in the present state of our knowledge of the renal function. The kidneys of a man with these three marked symptoms are not able to bear any shock or any inflammation, for they are secreting but little beyond water, and are only just able to keep the patient living. The slightest extra strain such as that induced by mild cystitis or pyelo-nephritis will cripple the functions of the kidneys, and severe constitutional disturbance will result,* or the patient may even succumb. Hence it is, I submit, of the first importance that preliminary questions should be put to the patient relative to nocturnal incontinence, thirst, and morning nausea. Cystoscopy may be undertaken with the first symptoms without result, provided the introduction of the instrument is easily accomplished; it may even be undertaken with the first two and only a moderate reaction ensue, but with all three the investigation is undoubtedly dangerous.

2. *Preliminary investigation of the Rectal Face of the Prostate is essential.*—It is, or should be, a golden rule

* A parallel is to be found in over-cutting the corn of a man with advanced atheroma or senile degeneration of the

that no male patient should be cystoscoped without a rectal examination of the prostate and the base of the bladder having been first undertaken. This rule should be even more strictly adhered to in dealing with patients over forty-five. The operator who neglects this very ordinary precaution and who fails to make a digital examination of the prostate courts failure, for many contra-indications to cystoscopy are to be found *per rectum*.

The chief condition which would lead one to anticipate a difficulty in passing the cystoscope is a marked inequality in the size of the lobes (localised inflammation, fibro-adenoma).

Those conditions which absolutely contra-indicate the examination are :

(a) A marked denseness or hardness of one or both lobes * (tubercle, stone, carcinoma).

(b) A prostate of abnormal size lengthways (not transversely) one whose summit cannot be reached by the index finger (fibro-adenoma, carcinoma of an advanced stage).

3. *The cystoscope used should have an appropriate curve and not a sharp elbow.*

"Prostatic" cystoscopes (page 37), or those furnished with a curve like the calculus sound (page 27), should be used in cases in which the prostate is known to be enlarged.

Any prostatic obstruction which does not readily yield when the ocular end of the cystoscope is lowered should be respected, and this method of examination should be carried out under anaesthesia or abandoned.

Some prostatic channels which resolutely obstruct the passage of the cystoscope are easily traversed when the patient is under the influence of an anaesthetic. As a general rule it is wiser to administer this after the age of fifty in patients who are suffering from obscure vesical symptoms, and be prepared for litholapaxy or other operations than make two sittings of the case.

* Author.—(a) The rectal contour of 1000 prostates, 'Brit. Med. Journal,' vol. xviii, p. 9; (b) hard carcinoma of the prostate gland, 'Edin. Med. Journal,' vol. xix, p. 7.

It may be here remarked that the most insurmountable prostatic obstructions are due to hard carcinoma of the subtrigonal parts of the prostate.

Some of the worst renal reactions due to prostatic instrumentation which I have witnessed have been evoked by passing a cystoscope through a gland hardened by years of sexual excess and recurrent septic invasions.

The Value of Cystoscopy in Senile Enlargement of the Prostate.

The opinion of the profession is at present divided as to the best route to be adopted in enucleating the adenomatous lobes of the enlarged prostate. One school advocates the supra-pubic route in all cases and condemns the perineal; another contends that the supra-pubic method is unnecessarily severe and advises the perineal line of attack. Probably the balance of opinion will be to remove all very big elastic prostates by the supra-pubic route and all medium-sized and small prostates by the perineal route, while the cystoscope will only be used in the latter cases to determine as to whether a median lobe or a collar is the main source of the prostatic symptoms, and as to whether it can be cut through by Bottini's method or removed better from above than from below.

Only one point need be impressed upon the cystoscopist. *No median lobe as seen by the cystoscope is as large as the instrument reveals it.*

In all cases the prism must of necessity almost touch the "median" lobe, and that projection is necessarily magnified by the approximation of the lens to the object, for the nearer the object is to the lens the larger it appears. Unless this magnifying power of the cystoscope is taken into consideration the operator may decide that a really small lobe is a very large projection, and that the supra-pubic route is necessary. Then on examining the bladder neck with his finger introduced through the supra-pubic incision he will be much chagrined to find that the

median or lateral projection is in reality small, and that he has been deceived by the magnifying power of the lens.

The Cystoscopic Examination of an Enlarged Prostatic Outgrowth (Intra-vesical).

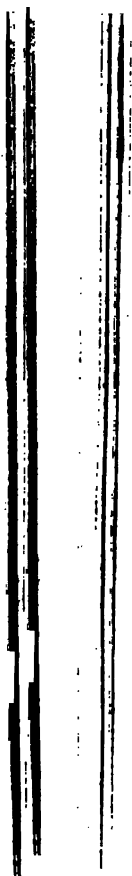
The cystoscopist having duly cross-examined his patient (see page 525) and found no rectal contra-indication for the instrument (see page 525) arranges that five or six ounces of clear medium are present in the bladder. He sees that the pelvis is properly elevated on a thick cushion or book, and that the posterior urethra is cocainised, or better still, that an anæsthetic has been administered; he then passes the proper cystoscope gently and fully into the bladder and turns the beak downwards. By gently withdrawing it a little the beak will be felt to impinge on the back of prostatic enlargement. But only a small area of this will be visible through the window, and the combined picture and mental appreciation of the character of the outgrowth must be obtained by rotating the instrument, guiding it by sight, so that the prism skirts the surface of the projection.

It is noted that the projection is smooth and rounded, of the colour of dull buccal mucous membrane, that behind it is a background formed by the mucous membrane of the adjoining wall of the bladder (Plate XXVII), which is yellowish white if there be no cystitis present, or reddish if the mucous membrane is inflamed. The shape of the lobe is now ascertained, whether it be in the form of a collar or a definite intra-vesical tumour. A few minute cyst-like bodies, much magnified till they resemble the size of grape pips, may appear standing vertically on the mucous membrane of the lobe. These are the evidence of basal irritation, and need not be regarded.

But if the surface of the lobe has lost its smooth character, and appears ulcerated, nodular, or irregular, the question of carcinoma attacking the fibro-adenomatous prostate must be entertained.



Small part of a projecting intravesical prostatic lobe (in "enlargement of the prostate"). Note contrast of colour of lobe with yellowish white of posterior wall of bladder.



I know of no cystoscopic diagnosis more difficult than that of early carcinomatous transformation of a fibro-adenomatous benign outgrowth when the growth has invaded the mucous membrane of the neck. This is due, I believe, to the misleading magnifying effect of the details of the surface, due to the approximated prism. Moreover, the surface is liable in catheter life to all manner of changes, inflammatory and traumatic, and these being magnified resemble the erosions of carcinoma.

In these doubtful cases it is not of much clinical value to point to an elastic prostate, as estimated by examination of its rectal contour, as deciding that the prostatic enlargement is benign in character, and therefore that the changes seen at the vesical orifice are benign. I have known carcinomatous change to affect the vesical orifice of the urethra and make its way into the adjacent layers of the subjacent prostate, and yet the prostate *per rectum* to feel elastic and benign. I have met with an apparently smooth mucous membrane at the urethral orifice, and yet the subjacent prostate has been infiltrated with carcinomatous material, although that prostate has felt elastic *per rectum*. I admit these cases have been examined at the very outset, directly symptoms have appeared, and that they are rare, but attention should be drawn to them, for they form a small and definite group by themselves.

They can be suspected by the rigidity of the urethral orifice of the bladder, as appreciated by the introduction of the cystoscope.

CHAPTER XXIX.

THE VALUE OF THE CYSTOSCOPE IN BILHARZIAL DISEASE OF THE BLADDER OR KIDNEY.

Bilharzia hæmatobia of the vesical mucous membrane used to be very rarely met with in Great Britain, but since the Egyptian and South African campaigns numerous cases have occurred in hospital and private practice. I have had at least a dozen typical examples. In nearly every stage the cystoscopic appearances of the disease resemble tuberculosis, and in the latest stage epithelioma of the bladder. The history of the case, and the ova which are usually to be found in the urine, form the clue to the true nature of the disease.

The disease is well understood. The adult worm, which seems to gain entrance by the skin or mouth either in bathing or drinking infected water, inhabits the smaller tributaries of the portal vein of man, usually in large numbers. The females, which are the more numerous, produce a vast number of oval eggs, 130 to 200 μ long, and 50 to 60 μ or more broad, each having a spinous projection at one pole. These, escaping from the portal capillaries, become diffused throughout the mucous and submucous coats of the bladder, rectum, and other pelvic viscera. Microscopically the yellowish, spinous, oval eggs are seen lying in the superficial layers of the bladder wall, and around them there is more or less leucocytic infiltration. The cystoscopic appearances vary according to the amount of disturbance the eggs evoke in the



A.—Clump of eggs of *Bilharzia* *Hæmatobia* like rice grains.



B.—Minute Hæmorrhages marking the areas of escape of the eggs.

mucous membrane. They may remain quiescent, and then appear, cystoscopically, as small clumps of white rice grains scattered over the bladder in patches (Plate XXVIIIa). Usually, however, they irritate, and inflammatory infiltration occurs around them, and the mucous membrane then appears to be patched with minute bright red points of blood, as if the sharp-pointed ova had just escaped (Plate XXVIIIb). Severe grades of irritation cause distinct patches of hyperæmia and ecchymosis, the mucous membrane becoming swollen, and appearing upraised, denuded of epithelium, and obviously inflamed.

In old standing cases papilliferous outgrowths are found, and these, as well as the adjacent areas of the bladder, are covered with encrustations of phosphatic salts. Ultimately epithelioma may attack this new formation, perhaps induced by the irritation of the parasite. Thus, in one of my cases, that of a man who had suffered from a recognised Cape hæmaturia for two or more years, the epithelioma was most marked. When he came under observation he was passing a large quantity of blood, and sank soon afterwards. On post mortem the bladder was found to be full of nodular masses of epithelioma, which arose chiefly from the walls, leaving the base free. I could not discover any ova either in the superficial or deep parts of the growth, although competent observers had detected them in the urine some time before the symptoms increased in fatal severity. Secondary growths existed in the glands of the pelvis and lumbar region. The liver was largely implicated.

Griesinger* gives the following description, which tallies with the cystoscopic appearances I have noted in my cases without the knowledge of Griesinger's work on the subject:

"The simplest, slightest, and first changes in the

* "Clinical and Anatomical Observations on the Diseases of Egypt," *Arch. f. Physiol. Heilkunde*, 1854. Quoted from *Journal of Tropical Medicine*, April, 1903; article by Dr. Carl Goebel.

vesical mucous membrane consist of spots of hyperæmia, which are sometimes sharply outlined and sometimes somewhat obliterated at the borders; there are many small extravasations of blood, the mucous membrane at such places being somewhat swollen or puffy, and often, but not always, coated with viscid mucus, or with a copious greyish-yellow or sanguineous exudation; quantities of the ova of the distomum are found in these discharges. In isolated cases the entire mucous membrane of the bladder exhibits marked injection and ecchymosis; in the great majority of the cases the process is limited to small spots varying in size from a lentil to a sixpenny-piece, particularly on the posterior wall of the bladder. In a great many cases—at a later stage of the disease—greyish-yellow, yellowish, or dull white elevations of the mucous membrane, mingled with many spots of pigment, are found; there are occasionally smooth, leather-like coatings beneath the mucous membrane that appear as if they had lain in spirits of wine; sometimes, however, the coating is friable, presenting a fine *débris* and yet very adherent. In many cases the coating is permeated with urinary salts, or a firm sand consisting of eggs or egg-shells. On trying to remove these patches it is found impossible without peeling off the outer layer of mucous membrane as well. The patches are occasionally very soft and friable, and partly mixed with extravasated blood. In isolated cases only dirty red, grey, or black raised spots of pigment are found in the otherwise unchanged mucous membrane, or in addition to fresh injection and congestion. In one case only, in a mucous membrane beset with many fresh ecchymoses, there was discovered a deep loss of mucous membrane the size of a sixpenny-piece, presenting an ulceration situated beneath a coating thickly encrusted with urinary salts.

“All these changes are attributable to extravasation and to a process of inflammation set up by the distoma invading the smaller branches of the vessels, and there

depositing their eggs, and the subsequent protrusion of the eggs from the torn vessels.

"In many cases, however, the appearances are quite different. On the vesical mucous membrane there are single or heaped-up excrescences or vegetations; they vary in size from a pea to a bean, and are yellowish, or of a sanguineous ecchymosed appearance; they are slightly raised, wart-shaped or fungoid, the top split, resembling condylomata or shaped like a cock's comb or raspberry, the base being somewhat constricted. As a rule their condition is such that the mucous membrane over them is unchanged, being only somewhat thicker and perhaps the lower stratum somewhat more adherent than in the normal. Sometimes they appear to be injected dark red throughout, and the body of the prominence is formed of the swollen submucous tissue, which is then soft, yellowish-brown, brittle, or marrow-like, or it may be firmed with a fleshy infiltration or entirely permeated with coagulated blood or pigment There are innumerable transitions from flattened and sessile patches to elevated and fungoid-looking protrusions. The muscular coat of the bladder is very rarely changed even in advanced stages, although it may be slightly hypertrophied, and only once did the peritoneum covering the bladder exhibit dark pigmented excrescences of cock's comb shape.

"Dr. Bilharz was able to extract the distoma from the submucous tissue that forms the excrescences; they lay in smooth-walled spaces which communicated with the blood-vessels.

"In numerous cases the mucous membrane of the ureters, occasionally independently of the bladder, exhibits the same changes which in very rare cases occur in the pelvis of the kidney also. In the ureters the diseased areas usually consist of irregular, island-like, yellowish-grey, slightly-elevated spots, which are formed of a soft but always adherent coating. As a rule it is sandy to the touch, and frequently contains a quantity of dark gravel with a number of ova. In this situation the changed

mucous surface causes more serious consequences than is the case in the bladder. The aggranderation in the mucous membrane, and the frequent thickening of the submucous layer causes stricture of the ureter, with fusion or spine-like elevation of the canal, hypertrophy of the muscles, retention of the urine, etc. . . . In several cases the mucous membrane of the ureter was beset with numerous cysts varying in size from a millet to a hemp seed."

The physician who is consulted on account of vesical irritation and hæmaturia by a young man who has been residing in Africa, especially Egypt* or Cape Colony, Natal or Transvaal, should at once examine microscopically the first few drops of the urine for the presence of ova. The earliest symptoms depend on irritation of the mucous membrane. They consist in penile pain and slight hæmaturia after urination. Both symptoms increase in severity as the disease develops, cystitis supervenes and with it appear the special symptoms indicative of that complication. The prognosis depends on the degree of infection, some guide to the degree being afforded by the cystoscopy and acuteness or severity of the clinical symptoms. I have found the best treatment to be a mixture of methylene blue and hairlem oil, but the cases are often very tedious and disappointing, even when taken early.

* The disease is endemic and severe among the fellahs of Egypt. Ruffer finds it in quite 50 per cent. of all necropsies on natives in Egypt. Guillemand, 1897, states that in Pietermaritzburg the majority of the male youths were apparently infected.—Quoted from the 'Encyclopedia Medica,' article "Parasites."

CHAPTER XXX.

THE USE OF THE CYSTOSCOPE IN DETECTING AND LOCALISING FOREIGN BODIES IN THE BLADDER.

THE value of the cystoscope in cases of foreign bodies in the bladder consists not only in determining for the surgeon their presence and nature, but also in indicating to him the means best suited for their removal.

I give a few illustrations, selected from a large series, which bear on these points.

EXAMPLE 1.—*Two and a half inches of thick wax taper seen with the cystoscope and removed by the lithotrite from a man's bladder.*—A man of 24, whose father was a "prostatic" and used a catheter, was suddenly seized with a desire to imitate the procedure. He obtained and passed into his urethra a thick wax taper, two and a half inches in length. It slipped from his fingers and entered his bladder. Being ashamed of his escapade, he waited until cystitis had developed, and then consulted Dr. Younger, who brought him to me. His story was rather discredited, but the white taper could be easily seen with the cystoscope floating about and oscillating with every respiration. It proved most difficult to grasp with the lithotrite, for it swung about like the needle of a mariner's compass, eluding the jaws of the instrument. By removing nearly all the water from the bladder one end was readily caught and the whole length removed. He recovered.

EXAMPLE 2.—*Four and a half inches of glass with a bulbous extremity, seen in a male bladder and removed by the lithotrite.*—My last similar case occurred in June, 1904. A gentleman, æt. 52, was exploring his own urethra with a glass rod four and a half inches long, one end of which terminated in a bulb. The glass slipped from his fingers and disappeared. Three weeks later he consulted Dr. George Morgan, of Brighton, who sent him to me.



EXAMPLE 5.—*Spikelet (in flower) of one of the grasses in a male bladder.*—Some years ago I was asked by Mr. Reginald Harrison to cystoscope a patient who presented himself with the following story. During a drunken debauch a friend had taken the head and stalk of a piece of grass and had passed it down his penis, stalk foremost. It disappeared. As nothing could be felt with the lithotrite the story was not believed, but, on introducing the cystoscope and turning it towards the right side of the bladder, the flowering spikelet of a grass could be clearly seen casting a shadow on the shining white mucous membrane of the adjacent posterior wall. The lithotrite being directed towards the object, the stem was readily seized and the grass withdrawn. I am indebted to Mr. Harrison for permission to allude to the case.*

EXAMPLE 6.—*Guide of a Maisonneuve or a Teevan urethrotome in a male bladder.**—It sometimes happens that the screw of a guide of a urethrotome slips or separates and the guide is left in the bladder. There is never any reason for any cutting operation to remove this. The bladder is washed out, presuming the stricture has been thoroughly severed (and, if this has not been done before the slipping of the guide, it must be thoroughly done by means of another guide and sheath), a lithotrite is passed, the loop is seized, and gently withdrawn. If there is any difficulty, the cystoscope may be used, and the exact position of the loop ascertained. This can then be grasped by the lithotrite and removed.

I need not allude to the many pieces of soft rubber catheters, guides, or bougies which I have removed in a similar way. Some very ancient bougies are so infiltrated with phosphatic material that they have been cut up with the lithotrite in the belief they were stone, and their true character unrecognised until they appeared in the wash bottle. In such cases the cystoscope should be passed at the end of the operation to prove that the bladder has been thoroughly cleared of all pieces.

EXAMPLE 7.—*Half a No. 8 E silver catheter left in bladder, the beak localised with the cystoscope, and the piece removed by means of the lithotrite.*—It does not often happen that a large silver catheter breaks in the bladder. The following is therefore of interest. In May, 1904, I was asked to see a patient with half a silver catheter in his bladder, with a view to removing it supra-pubically.

An old No. 8 E silver catheter, which had been probably cleaned

* Represented in Burchhardt and Fenwick, 'Atlas of Cystoscopy.'

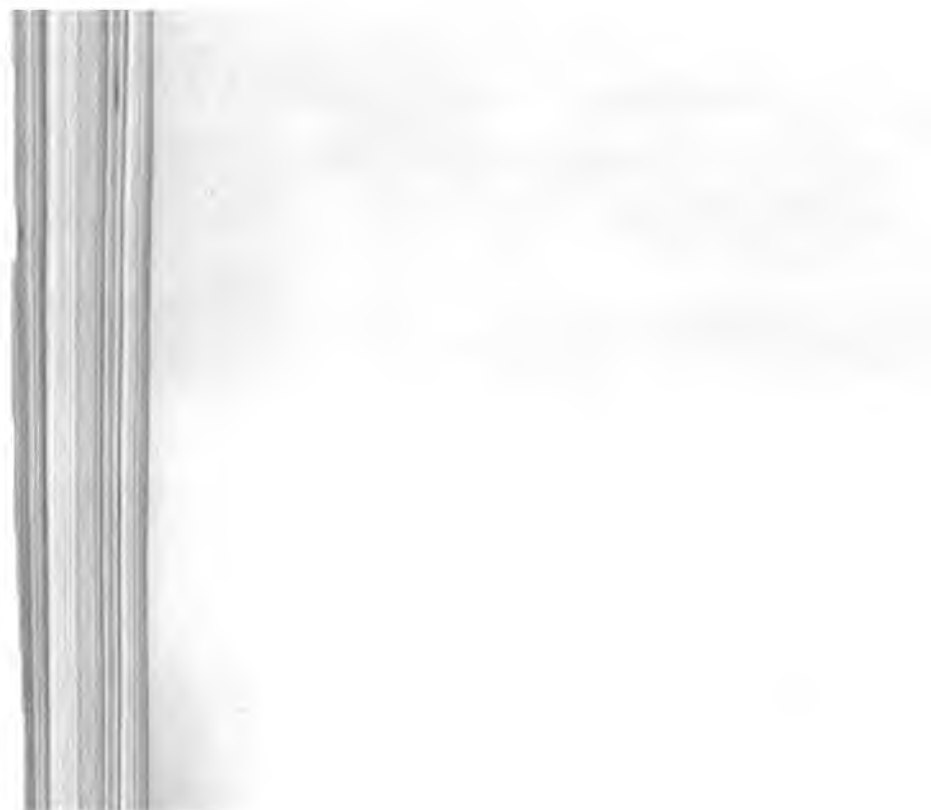
very vigorously and had cracked in the process, was passed into the bladder of a male patient, prior to washing out that viscus. On depressing the outer end the practitioner felt it snap, and, on withdrawing the instrument, only a few inches of the straight portion was removed. Several attempts with forceps were then made to pull away the remainder of the catheter, the only result being to shove the piece into the bladder. I saw the patient a few hours later, and realised at once that if I caught the piece with the lithotrite by its *ragged broken end* and pulled it through the urethra I should tear and lacerate the wall of that channel beyond repair, even if I succeeded in dragging it through, which was doubtful. It was therefore of the greatest importance to know exactly where the *blunt* eye-end of the catheter lay, so as to direct the jaws of the lithotrite to that part.

With the cystoscope I found the catheter-piece lying transversely with the eye resting on the right ureter. It was now easy to introduce the lithotrite and to seize the blunt end of the beak of the catheter-piece and withdraw it along the urethra. This case is a good example of the value of the cystoscope in saving a patient a cutting operation and a tedious convalescence for the removal of a very awkward foreign body.

EXAMPLE 8.—*A suppurating dermoid of the ovary discharging a long lock of hair into the bladder; formation of stone upon the hairs; cystoscopy; laparotomy; perfect cure.*—I was consulted by a young married lady, æt. 27, for a profuse urethral discharge. She was in great distress, as her practitioner had expressed his opinion that she was suffering from acute gonorrhœa. Certainly all the appearances and symptoms favoured this view, but on cross-examination I learnt that she had noticed, three years ago, after her first confinement, that she was passing "large lumps of butter" in her water. Since then there had been increasing pain in her bladder and frequency of urination. Latterly there had been severe vesical irritability, great pain, and much muco-pus in the urine, which was the foulest I had ever encountered. On examining with an ordinary catheter the instrument impinged upon a huge stone which seemed to fill the bladder. The patient was reassured, domestic peace established, and litholapaxy agreed to. I crushed and removed, on May 5th, 1901, an irregular large phosphatic stone weighing nearly an ounce, but there was one piece I always failed to grasp, though I could touch it. It lay at the right side of the bladder low down. I passed in a cystoscope and saw the most interesting object I have met with in cystoscopy (Plate XXX). The bladder was reddened



Cystoscopic view of a wisp of phosphatic-encrusted hair entering bladder from a suppurating ovarian dermoid.
Note the swollen rugæ. (Author's case.)



and velvety like the bowel. At the right side behind the right ureteric orifice (which was not a slit, but small minute open hole) was a distinct cleft in the red and spongy mucous membrane. From out of this cleft there sprang a long tuft of dull reddish-yellow hair (the lady had brown hair). Each hair was covered with beads and clumps of white phosphatic material.

The history I had received, and smiled at,—of the lady having passed lumps of butter in her urine,—the severe cystitis, the intensely fœtid and fœcal urine, and the sight of the hair fixed to the bladder wall gave me the clue and diagnosis instantly. A suppurating dermoid* had broken into the bladder. I passed a Kelly tube into the bladder over the cleft, laid hold of the lock of hair with fine forceps, and drew it gently out. The more I pulled out the more hair came into view. It was rather like pulling out the hair stuffing of a cushion. After a large bundle of hair had been extracted there issued from a hole a gush of the same foul and fœtid pus which I had noticed in the urine.

I then performed abdominal section, and found a large cricket-ball-sized ovarian dermoid fixed in the pelvis to the right side of the bladder. I enucleated it. It smelt abominably. I plugged up the opening which had existed between the bladder and the interior of the dermoid, and brought out the gauze suprapubically.

She made a good recovery, and reported herself, June, 1904, in excellent health. The urine was clear; there were no vesical symptoms.

A contrast case.—It sometimes happens that a stone forms round a foreign body, of which the patient either will not or cannot give any history. This being detected by the sound, litholapaxy is carried out. The calculous deposit or crust is removed, but the nucleus is left behind to induce a fresh accumulation or it is felt during the operation greatly to the curiosity and even discomfiture of the operator. In such a case the value of the cystoscope is most striking. The following may be given as an illustration, especially as it affords a contrast to those already submitted to the reader.

Vesical stone forming on a split umbrella ring.†—A deaf mute, æt.

* Cf. author.—'Tumours of the Urinary Bladder,' Fasc. i.

† Quoted in author's second edition of 'Electric Illumination of the Bladder,' p. 200; and Author, 'Path. Trans.,' 1887, vol. xxxviii, p. 193.

22, with infantile paralysis of the right side, was brought by his father for relief of symptoms of stone which had been noticed three months. The boy had been in the habit of masturbating.

A stone was detected and crushed by the late Mr. Heycock, under whose care the case came, and to whom I was indebted for permission to publish these details. It was noticed, during the operation, that the fragments evacuated did not correspond to the size of the stone, which had been gauged by the lithotrite at the commencement of the operation, and the most careful sounding did not reveal where the deficit lay. The boy developed symptoms of peritonitis and died.

I made the post-mortem and found slate-coloured pus in the sheath of the right rectus. This collection proved to be an extension upwards of severe extra-peritoneal cellulitis; it had started and had spread from the posterior surface of the bladder. The loops of small intestine, which occupied the recto-vesical pouch, were glued together and to the back of the bladder by soft lymph. The bladder and prostate were therefore removed *en masse*, and the former was opened in front. The vesical wall was thick, the cavity contracted, being only as large as a duck's egg. A split india-rubber umbrella ring was found behind the trigone; one side of its circumference rested on the inter-ureteric bar, and the other dipped into an ulcer of the posterior wall. On removing the ring and examining the ulcer more carefully it was seen to have perforated all the coats of the bladder, with the exception of the peritoneal, and it was evident that the urine had percolated through this opening, and had set up, primarily, a cellulitis, and secondarily a peritonitis. There is no doubt that this ulcer was caused by the foreign body, and must have finally given way under the distending force of the water used in the evacuation of the fragments, for the traces of the rush of water were visible under the peritoneal covering up to the top of the bladder in the form of a track of fine calculous *débris*.

The mucous membrane of the bladder was inflamed, the ureters healthy, and the condition of the other viscera apparently normal. It is presumable that the split umbrella ring had been pressed down the canal to produce erotic sensations.

This case has an important clinical aspect, in view of the value of the cystoscope. It will be at once conceded that the operator may be justly exonerated for having left so soft, so elastic, and so resilient a body as india-rubber in the bladder after litholapaxy. Doubtless, when his

instrument engaged the ring he would suppose that a fold of an atonic bladder had been grasped, and would wisely desist from crushing the same, while it is obvious that so sound-deadening a material would give no just or reliable evidence of its presence when struck with the beak of a solid steel sound, though it could have been at once detected by the electric cystoscope, and removed by the lithotrite without any difficulty.

CHAPTER XXXI.

THE VALUE OF THE CYSTOSCOPE IN DETECTING THE ORIFICES OF FISTULOUS TRACKS OPENING INTO THE BLADDER.

I HAVE hitherto contended that the value of the cystoscope in changes and diseases of the mucous membrane of the bladder and ureter is beyond all question, and I have demonstrated, I believe, that with care, experience, and good eyesight a sound diagnosis of disorders of these surfaces is generally a comparatively easy task.

It is, however, otherwise in diseases approaching the cavity of the bladder from the surrounding subperitoneal and peritoneal spaces, for in such instances the accuracy and, therefore, the value of the method diminishes. Thus it is especially difficult to detect fistulous openings of small size by means of the cystoscope, and it is quite impossible, upon cystoscopic grounds, to determine the direction of the track of the fistulous channel, the vesical opening of which is apparent through the instrument.

No general rules can, of course, be formulated, so that the subject must be dealt with by giving selected cases. Three main forms of fistulous openings are to be found in the bladder :

- A. Those connecting the bladder directly with an abscess not involving the bowel.
- B. Those connecting the bladder with the bowel either directly or indirectly.
- c. Those connecting the bladder with the solid viscera, such as the ovary, Fallopian tube, or uterus.

A. FISTULOUS TRACKS CONNECTING THE BLADDER WITH
ABSCESS SACS PLACED EITHER SUBPERITONEALLY OR
INTRA-PERITONEALLY.

A horseshoe fistula of the rectum is a typical example of the devious paths which are made by pent-up pus in its effort to force an outlet. Probably a more typical illustration of the extensive burrowings which pus can form in loose cellular tissue is to be found in the pelvic abscess. When such an abscess opens into the bladder it is obvious that the orifice of the track is no guide to the direction and extent of the main channel, still less to its minute side forkings. Of what value, then, can the cystoscope be in such a condition?

1. The orifice of the fistulous track can be detected by its means, and the area of the bladder upon which it opens can be noted for future operative interference.

It is of great operative value to detect the orifice, and to note the area upon which the track opens, for the first step to be taken in order to cure the neighbouring abscess is to dilate the orifice of the fistula with a probe or suitable instrument, and then to pass a flexible guide along the main fistulous track.

2. Seeing that the orifice of a fistula is often small, sometimes quite minute, it is extremely difficult to find it without a cystoscope.

Presuming that the cystoscope is not used, and the bladder is explored through the urethra by means of a Kelly tube, or supra-pubically through a speculum, the chances of finding a minute hole in a swollen, inflamed, and collapsed bladder are small. If, however, the area on which the fistulous track opens has been previously detected by the cystoscope in the distended bladder, it is easy to narrow the search by placing the Kelly tube or the caisson speculum right over that area.

3. Some idea of the propinquity and acuteness of the neighbouring abscess may be obtained by cystoscopy.

The mucous membrane around the vesical orifice of the

fistulous track is generally very œdematous and covered with fixed, swollen, pulpy rugæ. The greater the swelling of the mucous membrane the nearer the abscess is likely to be. The more fluid the pus issuing from the hole the acuter the abscess.

Cystoscopy of a Vesical Opening of a Fistulous Track leading to a Suppurating Focus in the neighbourhood of the Bladder.

The cystoscopist rapidly surveys the interior of the bladder. He will find perhaps that the entire mucous membrane is swollen, dull, and even denuded of epithelium, due, most probably, to a subacute cystitis. But his attention will be at once arrested by seeing a collection of gelatinous, dull red eminences, with deep cracks between each. This marks the area upon which the fistulous track opens, and it is here that the orifice has to be searched for. Such areas and orifices are not infrequently found on the posterior wall behind the ureteric openings; the inflammatory exudation in the pelvic cellular tissue falling by gravity is apparently guided there by the leashes of veins, arteries, and the ureters entering at the lower angles of the bladder.

But the orifice of the fistula may not be apparent, it may be hidden under a projecting œdematous ridge or fold. The œdematous area is noted, and a watch is kept on it for the escape into the bladder of some of the contents of the abscess sac.

If the disease is acute and the pus plentiful it will issue in fluid form, and, when pressure is placed on the belly, it may be seen spurting out in a little jet.

If, however, the pus is old, thick, or inspissated and the abscess sac healing and contracting, a long, tape-like process of thick, firm pus will be seen emerging from under a fold or from a distinct crack just like a telegraph tape rolls off a drum or a macaroni stick issues from its mould.

An Especial Fallacy.—I have alluded to the ureteric efflux of solid tapes of pus, and have given illustrative cases (pp. 347, 464). This occurs in certain suppurative diseases of an inactive kidney. The cystoscopist can easily distinguish between the efflux of solid pus from an abscess sac and that from the ureteric orifice. The former appears between great red swollen folds of mucous membrane on the posterior wall, whilst the latter issues from the outer angle of trigone, and when the flow has temporarily ceased the ureteric orifice appears.

As it is impossible to give more than typical illustrations of the subject I have selected the following:

EXAMPLE 1.—*Multiple pyæmic abscesses after pregnancy—joints involved; each abscess sac opened and cured; finally an abscess bursting into bladder; orifice found by means of the cystoscope and dilated; cure.*—A lady was sent to me by Dr. Valentine Rees, of Brecon. She had had multiple pyæmic abscesses, all of which he had drained and cured. When all was going on well, and the lady apparently over her trouble, a pelvic abscess supervened, and finally opened into the bladder; the position of the abscess was doubtful. On cystoscopy the orifice of the abscess was easily detected, and Mr. Woodhouse Braine, my assistant, and I watched for some time the following curious phenomenon of pus being forced into the bladder through a minute opening. On the right lateral wall of the bladder lay down enormously swollen folds of mucous membrane were seen. In a furrow between two of these succulent rugæ I suddenly noticed a long, white, tapeworm-like body being forced out. It was square ended, and appeared just like a minute tapeworm. After about one third of an inch had protruded, it broke off by its own weight, and fell heavily to the base of the bladder.

Turning the light on to the base I saw a small heap of similar ribbons of white material. These were sucked out of the bladder, and seen to be merely tape-like threads of inspissated pus one eighth of an inch broad and one sixteenth of an inch thick. They were evidently being forced out of an abscess sac into the bladder through a very small channel of communication; and probably the severe pain which the lady had been suffering from for months, and which had necessitated the daily exhibition of large doses of morphia, was caused by the pus being pent up under great pressure.

On introducing a probe together with the electric cystoscope* into the bladder I was able to direct the former against the opening whence the pus was issuing, and was lucky enough to engage the orifice and push it on into the abscess sac. Immediately a cloud of pus swept over the field and obscured the view. Giving the probe to my assistant I cautiously raised the pelvis, and proceeded to perform laparotomy, expecting to find a suppurating ovary on the right side. After separating a few omental adhesions I lifted the small gut out of the pelvic cavity, and felt for the abscess, but without success. The right ovary felt normal. There was no collection of pus in the peritoneal cavity, for I turned on the searchlight and swept the floor of the pelvis with it. The peritoneum was discoloured and thick on the right side, as it appears when suppuration has been proceeding beneath it. Obviously the abscess was beneath the peritoneum and in the cellular tissue on the right side of the bladder. I gave up the search and closed the wound, but determined to attack the abscess sac from the vagina, and drain it from below. I made a free incision along the right side of the roof of the vagina on to the probe, expecting to hit the abscess sac without opening the bladder. To my dismay I found that the probe had slipped out of the sac during the varied manipulations to which the patient had been subjected. After an ineffectual attempt to re-insert it through the narrow orifice by aid of the cystoscope, I turned once more to the incision in the roof of the vagina, and cautiously dissected back between the bladder base, the rectum, and the uterus, hunting for the emptied abscess sac.

Failing to find it, however, although I had gone dangerously near the right internal iliac vessels, I inserted a drainage-tube into the gaping wound in the roof of the vagina, and packed it round with cyanide gauze, hoping, almost against hope, that the stirring up which I had given to the cellular tissue would act beneficially upon the abscess and induce it to heal. The pus disappeared from the urine, the pain gradually lessened, frequency of micturition diminished, and I learnt some years later that the patient had quite recovered her health, and that no trace of her bladder trouble existed.

EXAMPLE 2.—*Typhoid fever; abscess bursting into right side of the bladder of a woman; orifice detected; expectant treatment; cure.*—In November, 1900, Dr. Redmayne, of Hastings, sent me a young lady, æt. 22, suffering from pyuria, and with the history of an

* This occurred before Kelly's method was introduced. The technique of such operations has been entirely altered by the Kelly procedure.

abscess having burst into her bladder. Thus, in June, 1900, she had an attack of typhoid fever, the temperature oscillated, and finally dropped in the usual fashion. Seven days later it rose to 101° , maintained this level maximum for seven days, and then fell, a large amount of pus coincidentally being passed with the urine.

She was sent to the seaside and regained her health gradually, but it was noticed that the urine still contained pus, and when it disappeared and the urine was passed clear, her temperature rose at once. On freely washing out and distending the bladder the discharge of pus usually recommenced and the temperature fell.

Cystoscopy (November 28th, 1900).—"There is a sinus leading into the bladder on the right side three quarters of an inch behind the natural position of the orifice of the right ureter.

The size of the sinus orifice is one thirty-second to one sixteenth of an inch. It is elongated transversely—that is to say, the opening is a flat chink (size gauged by the pieces of inspissated pus forced through this opening into the bladder, which I will notice immediately).

The abscess sac lies probably to the right of the bladder, and has displaced the right ureteric tube by pushing or dragging on the tube. This is inferred from the fact that the right ureteric orifice could not be discovered in its usual position, whilst the left ureteric orifice is healthy and in its proper place. Moreover, the entire right side of the base is swollen and raised up in thick gelatinous *fixed rugæ*."

The manner in which I discovered so minute an orifice buried as it was in the middle of such huge swollen folds was as follows:—Seeing the swollen folds I watched this area intently. After a while I saw a thin, flat ribbon or tape of pus issue from the wall, in shape just like a tapeworm, and roll down onto the base. The tape having ceased, I easily saw the chink where it had issued. After a few seconds the same phenomenon was repeated.

An expectant treatment for three months was advised because I have found that when the pus is extruded in thick tapes that the abscess seems healing.

Second cystoscopy (March, 1901).—Both ureteric orifices detected easily, but they are swollen. The right side of base is still covered with heaped-up gelatinous rugæ, but no pus tapes observed. Considered better; pus still in urine.

November, 1902.—Water quite clear. No difficulty. Bladder free. Well.

January, 1904.—Some difficulty due to bending of urethral channel, probably contraction of inflamed tissue lying to the right of bladder, relieved at once by passing a steel bougie.

July, 1904.—Well. Passes steel bougie occasionally.

B. FISTULOUS OPENINGS CONNECTING THE BLADDER WITH THE
BOWEL, EITHER INDIRECTLY OR DIRECTLY.

The cystoscopist is sometimes asked to examine a patient who passes gas at the end of urination, the supposition being that the gas has gained entrance to the bladder from the bowel, and that there is a communication between these two viscera. The symptoms may consist merely in a few larger or smaller bubbles of gas interfering with the flow of urine, frothing the secretion, or coming away in little wheezes, or whistles, or puffs at the end of the act. If, however, the gas is in small amount and no faecal material is found in the urine, if it causes no pain and only the symptoms of cystitis are present, the clinician will act wisely if he takes a more hopeful view of the case. He will bear in mind that gas can develop in the bladder through the action upon the urine of some fermenting organism.

A certain number of old men suffering from residual urine, with or without glycosuria, complain of this symptom. It will generally be found that habitual catheterisation has been practised, and probably some organism *

* Favre isolated an organism in 1888. Since then much work has been done on the subject.

Senator discovered the yeast plant in a glycosuric, and Pere the *Bacillus coli communis*.

In sugar-free urines, Favre, Schow, and Heyse have made detailed bacteriologic studies. The organisms described by these authors are almost identical, differing only in details, in which there is always some variation. They all belong to the group of which the *Bacillus coli communis* is the type, and Heyse has identified the organism in his case with the *Bacillus lactis aërogenes*. Schow names the one found in his case *Coccobacillus aërogenes vesicæ*. The following are the main characteristics of the three organisms; they are plump, short rodlets, sometimes occurring in pairs; they grow aërobically on the various media, forming gas in the gelatine stab cultures and not liquefying the gelatine. Favre's bacillus is motile, Schow's slightly so, and Heyse's non-motile. Favre's form shows an inequality in staining, suggesting the formation of spores. Urine media become alkaline after the growth of the organisms, excepting Favre's, which produces acid. Heyse's bacillus

introduced into the bladder by means of this instrument is causing fermentation. Cystoscopy only reveals cystitis: with appropriate vesical irrigation and medicine these cases get well.

Gas may even form in the kidney pelvis and be seen to escape into the bladder by the ureteric orifice, a circumstance of extreme rarity. Of such cases Kelly has reported one, which I quote,* and three others are in the literature.

Mrs. J. H—, æt. 36, married fifteen years, II—para, normal labours. About four months after marriage noted pain on urination. Two years later began to pass minute white calculi, and during the next four years passed three larger calculi with much pain. At present has pain and swelling in left lumbar region and constant pain in bladder, especially just before urination; the urine always contains pus; for one year has passed gas from urethra in large amounts. Left kidney is felt as a hard tumour, the size of two fists.

Cystoscopic examination (No. 10 cystoscope).—Bladder mucosa normal. Right ureteric orifice easily found and normal in appearance, and the urine clear issuing from it. The left ureteric orifice found by seeing issuing from it pus and gas bubbles. This was wiped away and the ureter easily discovered surrounded by a reddish area. On pressure over the kidney pus could be squeezed out of the ureter, and mixed with the pus were numerous air bubbles. On attempting to pass a metal catheter a stricture of the lower portion of the ureter was discovered. A flexible, wax-tipped $1\frac{1}{2}$ mm. catheter was easily passed on first attempt and entered to the kidney; no scratch marks on the wax. Pus withdrawn was thick, viscid, and of a foul odour.

Nephrotomy was done and a drainage-tube inserted into the kidney, after evacuating the gas and washing out the pus which

is said to produce acid also by changing lactose into lactic acid. The organisms are pathogenic to rabbits; Heyse's also to guinea-pigs and mice. The gases produced are carbon dioxide, oxygen, nitrogen, hydrogen, and marsh-gas.

* One of the cases in which the bladder was found distended with gas is described by Welch and Flexner. In this case the organism was the *Bacillus aerogenes capsulatus* (Welch), which is distinguished by its size and aerobic growth. The gas produced was chiefly hydrogen, and burned with a blue flame. Quoted from Kelly and McCallum, 'Journal American Medical Association,' 1898.

was found in its cavity. The patient made an uninterrupted recovery.

Cultures from the kidney were not definitely successful in isolating a single organism.

While the cystoscopy of the fermentative pneumaturia is easy and the prognosis favourable it is otherwise as regards the diagnosis, prognosis, and treatment of patients in whose urine there is faecal matter as well as air. For, although the passage of air *per urethram* is not an absolute certainty of a communication, yet food or faecal material, observed microscopically or visually, accompanying pneumaturia is pathognomonic of vesico-enteric fistula.

In the larger number of the cases of vesico-enteric fistula which I have met with there has been no carcinoma of the bowel, but a dense mass of inflammatory adhesion has existed between the loops of intestine and the bladder, with perforation of both viscera. It occurs, I believe, most often in males, and the large bowel is most often involved. The communication is not always direct; in fact, there often seems to be a sac in the midst of the matting material between the intestine and the bladder, "*a foyer intermediaire*,"* nor, indeed, is the track between the bladder and apposed bowel a straight undeviating way. Often it is oblique and tortuous, and thus a valvular bladder orifice is formed which permits gas or faecal elements to pass into the bladder, but not back from the bladder into the gut.

Occasionally, however, the opposite extreme holds, for the hole is so large that one or even two fingers can be passed through the perforation. In these the urine enters the rectum or bowel and induces an irritative diarrhoea, a point which introduces the subject of the difficulties of cystoscopy in such cases.

Difficulties in cystoscopy.—At the risk of repetition I wish to insist upon the difficulty of seeing, by means of

* Chavaunaz found this existing in 22·10 per cent. of his cases.

cystoscopy, a minute orificial connection with the bowel. The patient may only complain of a puff of fæcal gas when the act of urination takes place, or a slight fæcal smell in the urine with an occasional microscopical evidence of food. The cystoscopist, under these conditions, can rarely detect the orifice, for there is no guiding line in the shape of pus to be extruded from it by pressure. He must be guided by localised swelling of the mucous membrane, and be especially careful to note small collection of villous processes and grape-like cysts which are near or at the orifice of such irritating fistulæ.* He must bear in mind that the orifices may be multiple.

Under certain conditions cystoscopy is impossible as well as unnecessary.—In some cases the channel of communication between the bowel and the bladder is large; in one of my patients it admitted two fingers easily. In such a case the urine passes into the bowel, especially if the orifice is low in the large intestine. There is then a constant diarrhoea, whilst the fæcal matter passed *per urethram* is liquid or semi-solid, and intensely irritating. With these large openings cystoscopy is impossible, for the bladder cannot be distended with water, the medium pouring into the bowel as fast as it enters the bladder. Nor is cystoscopy of any use, for the clinical evidence is ample.

Again, in a certain proportion of such cases the puff of gas (pneumaturia) with a fæcal odour may be derived from the prostatic urethra by a communication between one of the seminal vesicles and the bowel, and for this the cystoscope is of course useless. Cf. failure (p. 555).

* The situation of the orifice of the fistula is of importance as governing the treatment. Chavaunaz's statistics are as follows in the cases in which the point was determined by autopsy (Kelly, op. cit.):

44·47 per cent. communicated with rectum.

24·07	"	"	"	sigmoid.
11·11	"	"	"	colon.
7·40	"	"	"	colon and ileum.
1·85	"	"	"	appendix.

Clinical Notes on Vesico-enteric Fistulæ.

I propose to give only three illustrations.

EXAMPLE 1.—I was asked by Mr. Lockhart Stephens, of Emsworth, September, 1903, to see a lady, æt. 60. She had had severe pain along the left ureter; none in the kidney. She had pus in the urine, was worried with vesical irritability and pain on urination, as well as constant perineal pain. She was anæmic, looked ill, and had wasted.

On cystoscopy the left ureteric orifice was open, and its margin was œdematous.

To its outer side was the minute orifice of a fistulous track, the margin being œdematous and raised so as to resemble a ring of white currants. The size was that of a small shot.

The right ureteric orifice was quite normal; the rest of the bladder was a little dim, but healthy.

Per vaginam the left side of the bladder base was firm and thick, the right healthy. The left side of the uterus was also badly defined, and to my fingers there felt a decided induration passing upwards along the left ureter.

I gave a bad prognosis, advised no operative interference, asserting that the left ureter was becoming blocked by the compression of cancerous growth around it, that probably this would open into the colon if it had not already formed a communication with it.

The bladder was washed out by Mr. Lockhart Stephens, and the bowels were carefully regulated by enemata and purgatives. The patient put on flesh and gained colour, and, very properly, the hopeless nature of my prognosis was commented on adversely by the friends, but little by little the improvement in her health gave way, fecal matter appeared in her urine, the communication between the bowel and bladder, either directly or through a ster-coral abscess, became more and more evident, the patient emaciated, and finally died.

I quote this case to show that the cystoscope was here a sure method of investigation, but, in the absence of a post mortem, it must remain an open question what caused the vesico-intestinal fistula.

EXAMPLE 2.—Dr. Edgecombe, of Harrogate, brought me, in 1899, a gentleman, æt. 45, who for twenty years had marked entero-vesical

fistula, the bladder opening into the rectum high up. Mr. Teale, of Leeds, had performed one operation for the relief of stone forming round a piece of hard fæces.

Cystoscopy.—Situated on the posterior wall in the middle line was a fig-shaped gelatinous granulation-body, speckled yellow, such as one seen guarding an old perineal fistula. This seemed to overhang the orifice of an opening into the gut. The bladder was contracted, and the water ran very freely through the opening into the first piece of the rectum.

On operating I found an enormously thick, inflammatory mass, matting the back and left side of the bladder to the bowel. There was a small opening and track, which I thoroughly denuded and cleaned. It gradually healed, and when I last heard, a year or two later, he was well. But the majority of the cases are unsuccessful.

EXAMPLE 3.—A young girl was sent to me from Cork. She was much exhausted by diarrhœa. Very little urine was passed except by the bowel, and she was greatly irritated by the passage of solid fæces *per urethram*. The opening from the bladder into the sigmoid was thick and indurated, and admitted two fingers. It was free from cancer, but the bowel and bladder were so tightly bound down to the pelvic brim that I felt nothing short of resection would suffice.

I resected a large amount of the sigmoid and first piece of rectum, and also resected the diseased part of the bladder and repaired both viscera. The girl died of shock.

It is a curious clinical fact that carcinoma of the rectum or sigmoid attached to and on the point of breaking into the bladder often heralds the destruction which causes the entero-vesical fistula by a severe attack of diarrhœa and vomiting. On or about the third day after onset of the gastric intestinal symptoms sudden acute cystitis supervenes with fæcal pneumaturia.

C. FISTULA BETWEEN THE BLADDER AND OTHER PELVIC VISCERA.

I have already quoted a case of suppurating ovarian dermoid opening into the bladder. Without referring to any other, I propose to allude to the following rare case.

CASE.—A tubal pregnancy of some years' duration; sac containing macerated fetus; fistule between sac and bowel and between sac and bladder; laparotomy; death.—I was asked to see a patient, æt. 42, who had a large abdominal tumour, stinking fæcal urine, pneumaturia, a prolonged hectic temperature, and great emaciation and cachexia.*

On cystoscopy the bladder was comparatively healthy, but I noticed the postero-superior wall was bulging forwards, and under the prominence was a fistulous opening (Plate XXXI).

I diagnosed a suppurating ovarian dermoid, and cut into the tumour above the pubes. It was adherent to the abdominal wall, so that the peritoneal cavity was not opened. Pus, fæces, and gas escaped in large quantities. After a thorough irrigation a bare fetal femur appeared at the incision, and then a humerus. I now felt a macerated fetus lying in a puddle of fæces, pus, and liquid rottenness, and gradually enucleated it piece by piece. Parts of the skull bones were adherent to the walls of the sac, and had to be peeled off with some force. I then tried to open the peritoneal cavity at the sides, in order to dissect out the wall of the sac in which the fetus had laid, but the bowels were not only adherent to it, but so greatly softened, that I desisted. Finally, I was forced to pack the big cavity of the sac. The patient rallied, and died in a few hours.

Before she died I was able to obtain a history from her, but it is open to doubt as regards the accuracy of the time. "She stated that eight (?) years before she came under my care she became pregnant, and when she was decidedly big she made arrangements for her confinement. The various symptoms of pregnancy, how-

* I received the following notes from the Gynæcologist:

Breasts do not look active; right nipple retracted; children all suckled at left breast.

Abdomen.—Central swelling reaching within two fingers' breadth above umbilicus. Skin over abdomen takes impression of stethoscope readily.

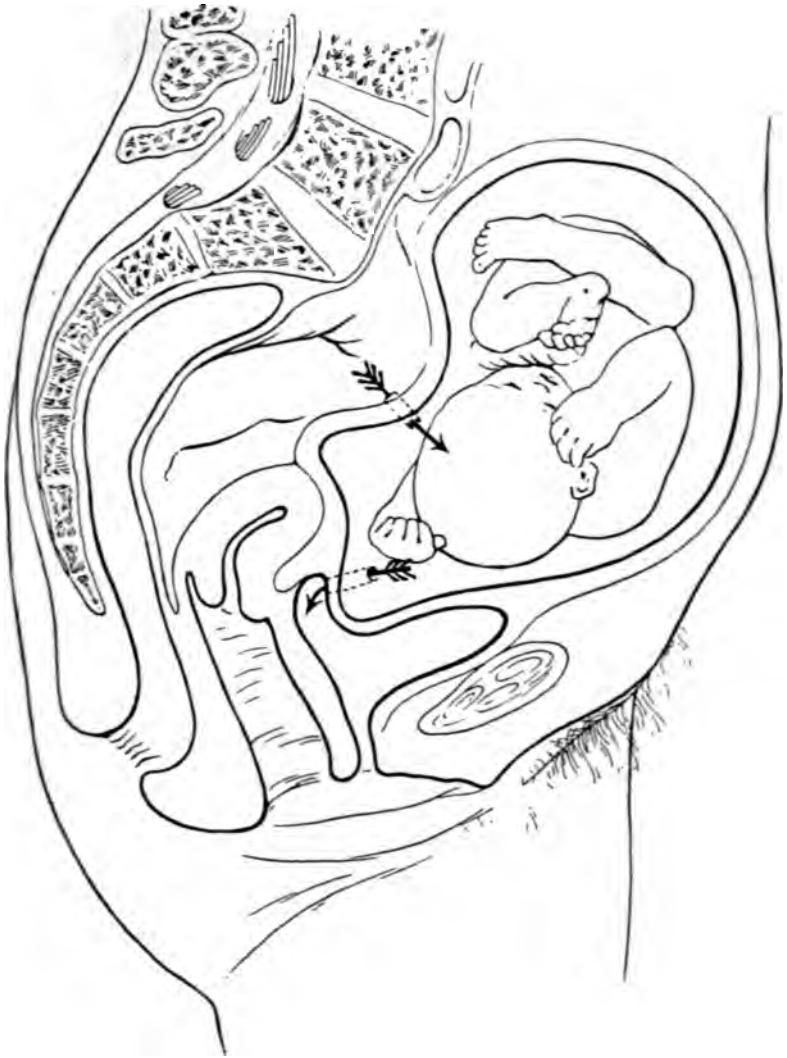
Auscultation.—Crackling sounds heard over swelling.

Percussion.—Resonance over swelling.

Abdomen is distended as a whole, though not very large.

Per vaginam.—Uterus fixed. Vaginal cervix small and not soft. Hard mass (fixed) in front of uterus continuous with swelling felt by abdomen; felt more to the left than right. Sound passed rather less than normal distance into uterus.

Catheter passed. A few drops of yellow, purulent, offensive fluid withdrawn (patient had previously micturated).



Tubal pregnancy of seven *years*' duration. Macerated foetus. Opening between sac and bowel (sigmoid), also between sac and bladder. Operation. Death.



ever, gradually disappeared, and her abdominal swelling subsided slightly, but for the last seven (?) years she has had a 'large lump' in her right side, which remained after her belly had gone down. Three months ago she received a severe blow on this lump, and two days later she had great pain in her belly and sickness. Since then she had been ill."

On post mortem it was evident I had been dealing with a left tubal pregnancy which had suppurated, become adherent in every direction, and perforated into the bladder and the sigmoid bowel (Plate XXXI). The sac which had contained the foetus could not be dissected away from the hollow viscera which surrounded it. The bones of the foetus were examined by an expert, and stated to be about the fifth month.

I cannot conclude this chapter without adducing a failure in order to show the limitations of cystoscopy.

I was asked to examine a gentleman over sixty years of age, who for some months had had symptoms of an abscess opening into his bladder. The pus decreased and increased as the temperature rose and fell. On cystoscopy I was much hampered in my view as well as disconcerted by a fixed and uniform bulging of the posterior wall. This so obliterated the bladder space that my cystoscopy was a failure. I could find no orifice of any abscess sac opening into the bladder. On examining by the bowel I encountered a large firm swelling between the rectum and the bladder back in the position I had noted during the cystoscopy, but what this was I could not determine. It was *hard* enough to be malignant, and yet the condition of the patient rather negatived this suspicion. I subsequently learnt that he suddenly became worse, and that a surgeon was called in to see him, found evidence of softening in the mass between the rectum and bladder, and promptly laid it open from the perineum. A large amount of pus was evacuated, and the patient was cured. I understand the diagnosis eventually made was suppuration of a vesicula seminalis.



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